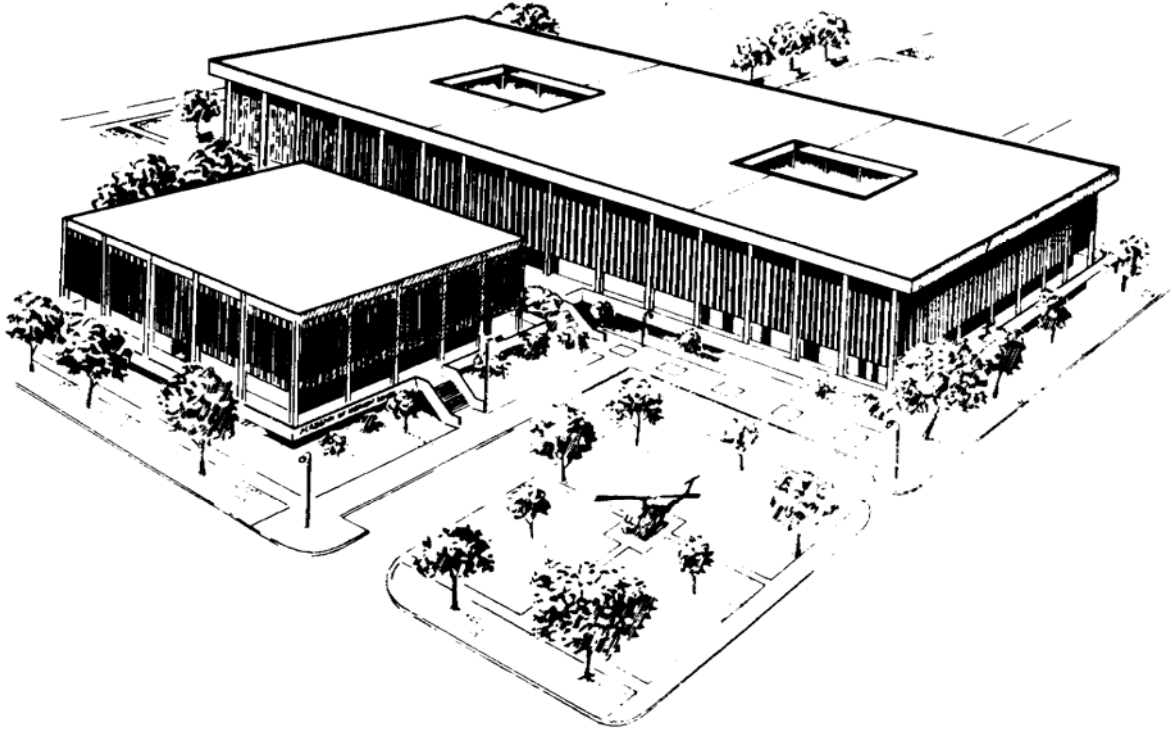

**U.S. ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL
FORT SAM HOUSTON, TEXAS 78234-6100**



RED MEATS

SUBCOURSE MD0710

EDITION 200

DEVELOPMENT

This subcourse is approved for resident and correspondence course instruction. It reflects the current thought of the Academy of Health Sciences and conforms to printed Department of the Army doctrine as closely as currently possible. Development and progress render such doctrine continuously subject to change.

ADMINISTRATION

For comments or questions regarding enrollment, student records, or shipments, contact the Nonresident Instruction Branch at DSN 471-5877, commercial (210) 221-5877, toll-free 1-800-344-2380; fax: 210-221-4012 or DSN 471-4012, e-mail accp@amedd.army.mil, or write to:

COMMANDER
AMEDDC&S
ATTN MCCS HSN
2105 11TH STREET SUITE 4192
FORT SAM HOUSTON TX 78234-5064

Approved students whose enrollments remain in good standing may apply to the Nonresident Instruction Branch for subsequent courses by telephone, letter, or e-mail.

Be sure your social security number is on all correspondence sent to the Academy of Health Sciences.

CLARIFICATION OF TRAINING LITERATURE TERMINOLOGY

When used in this publication, words such as "he," "him," "his," and "men" are intended to include both the masculine and feminine genders, unless specifically stated otherwise or when obvious in context.

.

TABLE OF CONTENTS

<u>Lesson</u>	<u>Paragraphs</u>
INTRODUCTION	
1 INTRODUCTION TO THE TERMINOLOGY OF RED MEATS	
Section I. Introduction	1-1--1-5
Section II. Terms	1-6--1-14
Section III. Wholesomeness	1-15
Section IV. References	1-16--1-17
Exercises	
2 INTRODUCTION TO BEEF	
Section I. General Knowledge	2-1--2-3
Section II. Grading of Beef	2-4--2-5
Exercises	
3 INSPECTION OF CARCASS, WHOLESALE AND MARKET-READY CUTS OF BEEF	
Section I. Inspection of Carcass Beef	3-1--3-3
Section II. Inspection of Wholesale and Market-Ready Cuts of Beef	3-4—3-6
Section III. Inspection Procedures for Meat and/or Meat Products	3-7
Exercises	
4 INSPECTION OF BEEF ROASTS AND STEAKS	
Section I. General	4-1
Section II. Inspection of Beef Roasts and Steaks	4-2--4-4
Section III. Determining Fat Content of Ground Beef	4-5
Exercises	
5 INSPECTION OF WHOLESALE MARKET CUTS OF PORK AND PORK LOIN ROASTS AND SLICES	
Section I. Introduction to Pork	5-1--5-6
Section II. Inspection of Wholesale Market Cuts of Pork and Pork Loin Roasts and Slices	5-7--5-9
Exercises	
6 INSPECTION OF COOKED, CURED, AND/OR SMOKED PRODUCTS	
Section I. Curing Meat	6-1--6-11
Section II. Smoking Meat	6-12--6-15
Section III. Sausage	6-16--6-22
Section IV. Inspection of Cooked, Cured, and/or Smoked Products	6-23
Exercises	

LIST OF TASKS TAUGHT

<u>Task Number</u>	<u>Task Title</u>
081-892-1042	Inspect Retail/Boxed Beef for Obvious Defects
081-892-1043	Inspect Retail/Boxed Pork for Obvious Defects
081-892-1020	Inspect Other Perishable Subsistence for Obvious Defects.

**CORRESPONDENCE COURSE OF
THE ACADEMY OF HEALTH SCIENCES, UNITED STATES ARMY**

SUBCOURSE MD0710

RED MEATS

INTRODUCTION

What is the major muscle of a rib eye steak? What is the landmark for separation of the forequarter from the hindquarter? What is the "packinghouse" term for the diaphragm? If you cannot answer these questions now, you will be able to when you have completed this subcourse, and you will also know the answers to many other questions. For those of you that already know this material, let it serve as a review.

Why are we interested in red meats? Defense Supply Center Philadelphia (DSCP) procures hundreds of millions of dollars worth of red meats each year for the Armed Forces. As a veterinary food inspection specialist, it is very important to have a working knowledge of red meats. You must understand the scientific terminology as well as the common or packinghouse terms. In order to protect the health of the troops as well as the financial interests of the government, the veterinary food inspection specialist must be able to perform the destination and surveillance inspections of red meats.

Subcourse Components:

The subcourse instructional material consists of the following:

Lesson 1, Introduction to the Terminology of Red Meats.

Lesson 2, Introduction to Beef.

Lesson 3, Inspection of Carcass, Wholesale and Market-Ready Cuts of Beef.

Lesson 4, Inspection of Beef Roasts and Steaks.

Lesson 5, Inspection of Wholesale Market Cuts of Pork and Pork Loin Roasts and Slices.

Lesson 6, Inspection of Cooked, Cured, and / or Smoked Products.

Here are some suggestions that may be helpful to you in completing this subcourse:

--Read and study each lesson carefully.

--Complete the subcourse lesson by lesson. After completing each lesson, work the exercises at the end of the lesson, marking your answers in this booklet.

--After completing each set of lesson exercises, compare your answers with those on the solution sheet that follows the exercises. If you have answered an exercise incorrectly, check the reference cited after the answer on the solution sheet to determine why your response was not the correct one.

Credit Awarded:

To receive credit hours, you must be officially enrolled and complete an examination furnished by the Nonresident Instruction Branch at Fort Sam Houston, Texas. Upon successful completion of the examination for this subcourse, you will be awarded 28 credit hours.

You can enroll by going to the web site <http://atrrs.army.mil> and enrolling under "Self Development" (School Code 555).

A listing of correspondence courses and subcourses available through the Nonresident Instruction Section is found in Chapter 4 of DA Pamphlet 350-59, Army Correspondence Course Program Catalog. The DA PAM is available at the following website: <http://www.usapa.army.mil/pdffiles/p350-59.pdf>.

LESSON ASSIGNMENT

LESSON 1

Introduction to the Terminology of Red Meats

LESSON ASSIGNMENT

Paragraphs 1-1 through 1-17.

LESSON OBJECTIVES

After completing this lesson you should be able to:

- 1-1. Identify anatomical terms of location.
- 1-2. Identify anatomical terms of bones.
- 1-3. Identify general red meat terms.
- 1-4. Identify carcass terms.
- 1-5. Identify body cavities and associated terms.
- 1-6. Identify the states of refrigeration.
- 1-7. Identify terms associated with the condition of meat or meat products.
- 1-8. Identify the inspection legend.
- 1-9. Identify the references used for red meats inspection.

SUGGESTION

After studying the lesson assignment, complete the exercises. These exercises will help you to achieve the lesson objectives.

LESSON 1

INTRODUCTION TO THE TERMINOLOGY OF RED MEATS

SECTION I. INTRODUCTION

1-1. GENERAL

Inspection of meat products may be performed at origin or at destination. The inspection consists of examining and/or testing contractor-owned foods, including the packaging and packing of the product. These inspections preclude the acceptance of meat items that are not wholesome, aesthetically acceptable or that are potentially dangerous to health. These inspections also protect the financial interests of the government and/or the nonappropriated fund activity by determining contractual compliance for identity, condition, quality, and quantity as specified by the procuring agency.

1-2. ORIGIN ACCEPTANCE INSPECTIONS (CATEGORY I)

This category of inspections is performed at the facilities of the commercial contractor. In order for you to evaluate carcasses for compliance with contractual requirements, you must know carcass nomenclature, terminology, and the descriptive terms used in the red meat industry. Part of your education for performing the duties as a veterinary food inspection specialist, we also present a brief description of antemortem and postmortem inspections, though it is understood that you will seldom have the opportunity to perform these inspections.

a. **Antemortem Inspection.** This inspection is conducted by physically examining the live animals before slaughter to detect disease or noxious conditions that would make them unfit for human consumption. The inspection should be conducted on the same day as the slaughter. Antemortem inspections are needed because there are diseases and conditions hazardous to human health that are best detected in live animals. An example of this would be rabies, a disease that affects the central nervous system. Antemortem inspections also prevent contamination of the slaughtering area by diseased animals.

b. **Postmortem Inspection.** This inspection involves the examination (and testing when required) of the head, carcass, and viscera of animals immediately after slaughter to determine if they are free of diseases or noxious conditions that would make them unfit for human consumption.

c. **In-plant Inspections.** This is an inspection performed at the establishment where the meat item is processed, manufactured, or fabricated. Some items are inspected while they are being processed or manufactured. In some cases, items are inspected after the manufacturing or processing is complete.

1-3. RECEIPT INSPECTIONS (CATEGORY II)

a. **On Delivery at Purchase (Destination).** This inspection is performed on meat items that are delivered to a military installation (Commissary, Navy Exchange (NEX), Army Air Force Exchange Service facility (AAFES), Morale, Welfare, and Recreation facilities (MWR), Dining Facilities, and so forth). This is the final inspection performed before transfer of ownership from the contractor to the government. Inspections are performed to ensure that food products and the production process comply with the requirements for sanitation, wholesomeness and condition, as well as quality provisions described in the purchase instrument.

b. **Any Receipt Except Purchase Inspection.** Government-owned meat items will be inspected when received from other Government and Department of Defense (DOD) agencies. Meat items will also be inspected when received from the facilities of a commercial contractor where the product was already inspected and accepted by the Government. This inspection includes the examination of the vehicle in which the supplies were transported, and the examination for identity, condition, quality and quantity of the meat items being delivered.

1-4. SURVEILLANCE INSPECTIONS (CATEGORY III)

Surveillance inspections are performed to determine if Government-owned subsistence is wholesome and suitable for further storage, shipment, issue, sale, and consumption. Prior to shipment, at issue or sale and in-storage inspections are the four types of surveillance inspections, and these inspections are performed at installations, storage facilities, ships, and activities.

1-5. ROLE OF INSPECTORS

a. **United States Department of Agriculture.** United States Department of Agriculture (USDA) inspectors perform antemortem, postmortem, and origin inspections, (paragraph 1-2) in the continental United States (CONUS). Inspections are performed immediately before and after the animals are slaughtered to make certain the meat is fit for human consumption. After slaughter, the animal is bled, skinned or de-haired, eviscerated, washed (with potable water), and placed in a chill room for up to 48 hours to lower the temperature of the carcass. The carcass is then transferred to a holding cooler where it is evaluated and given a grade designation. The USDA is responsible for procurement/acceptance inspection at origin when required by contract, or the contractor may perform the inspection. The meat for troop feeding in the United States is procured from plants operating under the supervision of the USDA.

b. **Military.** Military inspectors do not normally perform antemortem, postmortem, or origin inspections in CONUS. They can be performed as part of a cooperative training program between the Department of the Army (DA) and other

Federal agencies to maintain personnel inspection skill with the approval from The Office of the Surgeon General (OTSG). They may perform these inspections in overseas areas if directed. The military inspector in CONUS and overseas areas perform receipt and surveillance inspections (paragraphs 1-3 and 1-4).

Section II. TERMS

1-6. DIRECTIONS

In order to understand the position and direction of the various parts of the body, certain descriptive terms are used. In the explanation of these terms, assume that they apply to an animal in the standing position. See figure 1-1.

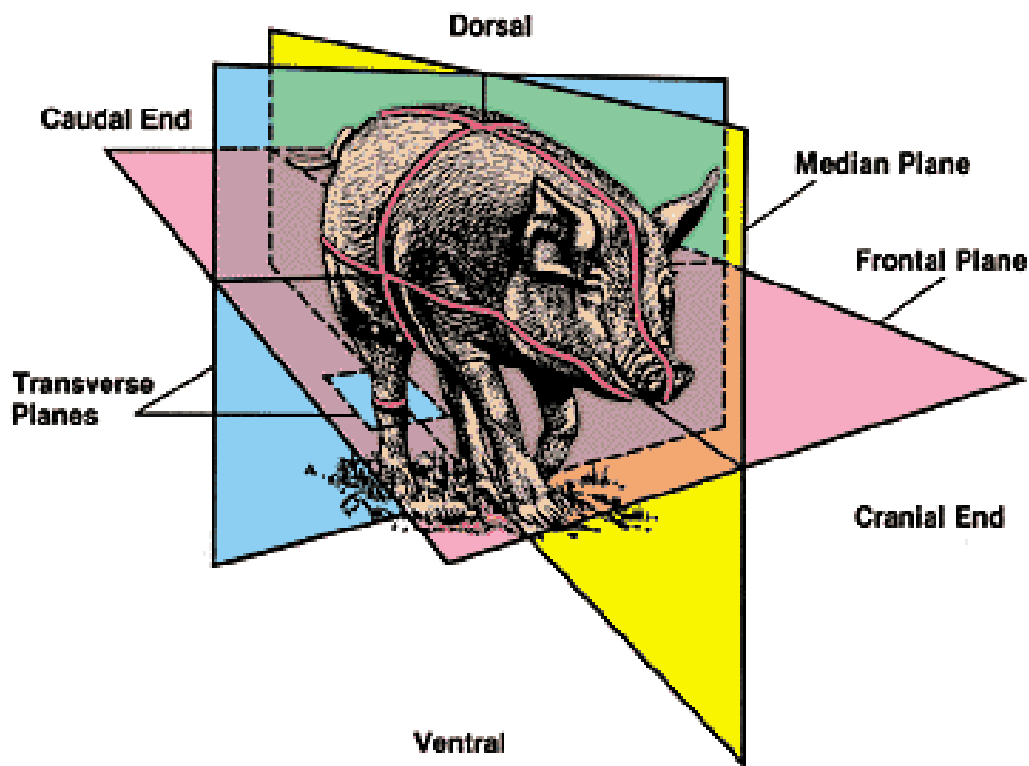


Figure 1-1. Directional planes of an animal.

a. **Ventral.** Directed to the place of support or in this case the surface on which the animal is standing. Ventral surfaces are directed toward the ground. The ventral side is considered the "belly side."

b. **Dorsal.** Directed away from the place of support. The dorsal surfaces are directed away from the ground. The dorsal side is the "back side." It is opposite of ventral.

c. **Anterior.** Directed toward the head of the animal.

d. **Posterior.** Directed toward the rear of the animal.

e. **Median Plane.** The vertical plane that passes through the vertebral column thus dividing the body into two equal halves.

f. **Medial.** Directed toward the median plane; it is inward or internal.

g. **Lateral.** Directed away from the median plane; it is external or outward.

h. **Proximal.** Area nearest the long axis of the body (referring to the area of the limbs). For example, the round bone (femur) is proximal to the hind shank (tibia).

i. **Distal.** Area farthest from the long axis of the body (referring to the area of the limbs). For example, the foreshank is distal to the elbow.

1-7. MAJOR BONES

Bone is a dense, hard tissue that forms the framework of the body. All of the bones collectively make up the skeleton. The skeleton supports and protects such soft tissues as the brain, lungs, and heart. Bones serve also as attachment points for skeletal muscles and act as levers for the muscles. The skeletal muscles give movement to the body. See figure 1-2.

a. **Classes.** Bones are divided into classes according to their shape.

(1) Long bones. Long bones are elongated and cylindrical in form, with enlarged extremities. The femur and humerus are examples of long bones.

(2) Flat bones. Flat bones are relatively thin and are expanded in length and breadth to provide a large surface area for attachment of the major muscles, primarily those of locomotion. The scapula and pubis are examples of flat bones.

(3) Short bones. Short bones are somewhat similar in dimensions in regard to length, width, and thickness. The carpus (knee) in the foreleg and the tarsus (hock) in the hind leg are examples of short bones.

(4) Irregular bones. Irregular bones are bones that have the continuity of their surfaces broken by the presence of projections (spines) or prominences. The vertebrae are examples of irregular bones.

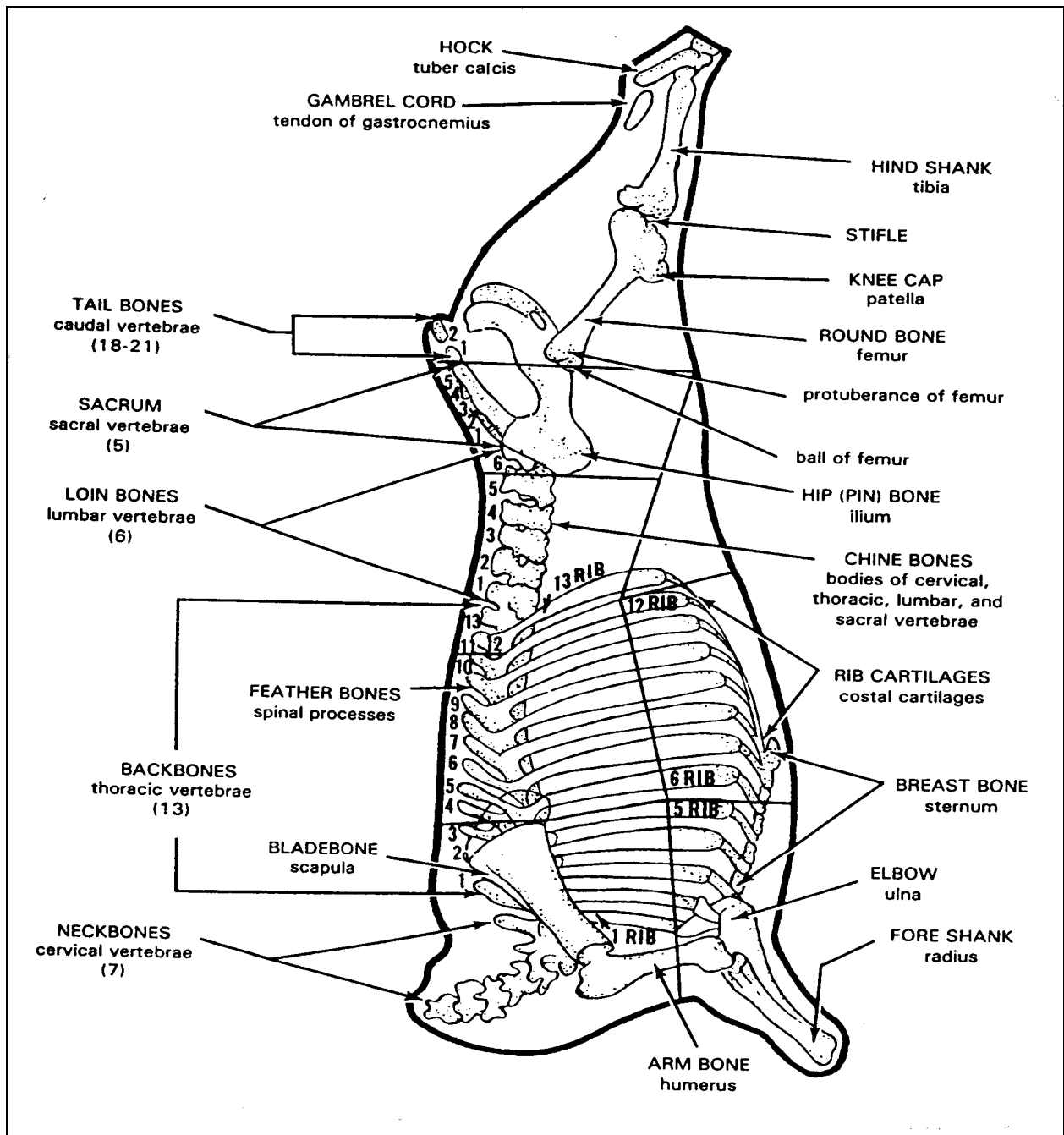


Figure 1-2. Beef skeleton.

b. **Names.** The scientific names and the common names of bones are listed below.

(1) Cervical vertebrae are the neck bones. All species of domestic food animals have seven cervical vertebrae. The two adjacent to the skull are the atlas and axis.

(2) Thoracic vertebrae are the backbones. Pigs have 14 or 15 thoracic vertebrae; sheep and cattle have 13.

(3) Lumbar vertebrae are the loin bones. Sheep and pigs have six or seven lumbar vertebrae; cattle have six.

(4) Sacral vertebrae are the rump bones. Sheep and pigs have four sacral vertebrae; cattle have five.

(5) Coccygeal (caudal) vertebrae are the tail bones. There are 16 to 18 in sheep, 18 to 20 in cattle and 20 to 23 in pigs.

(6) There are 13 pairs of rib bones.

(7) The scapula is the blade bone.

(8) The humerus is the arm bone.

(9) The radius and ulna are known as the foreshank.

(10) The olecranon is the elbow.

(11) The femur is the round bone.

(12) The patella is the kneecap.

(13) The tibia and fibula are the hind shank.

(14) The tuber coxae is the hip bone or pin bone.

(15) The ilium, ischium, and pubis compose the pelvis (or os coxae).

c. **Vertebral Formula.** As a memory aid the vertebral column divisions for red meats are expressed as the following formulas:

(1) Cattle: C-7, T-13, L-6, S-5, CY-18 to 21.

(2) Sheep: C-7, T-13, L-6 to 7, S-4, CY-16 to 18.

(3) Pigs: C-7, T-14 to 15, L-6 to 7, S-4, CY-20 to 23.

1-8. VERTEBRAL TERMS

In the preceding paragraphs, the names of the various bones of the skeleton were discussed. In the following paragraphs, we will relate important terms that are related to bones and certain specific bones of the skeleton to their positions in the

carcass. The positions and names of these Bones are important to you, as a veterinary food inspection specialist, because they are the unchangeable landmarks used for further breakdown of the carcass into smaller, more manageable pieces.

a. **Chine Bones.** The chine bones are the split bodies of the vertebrae, resulting from the longitudinal division of the carcass into sides.

b. **Featherbones.** The featherbones are the split dorsal processes of the thoracic vertebrae in each side of the carcass. They resemble the feathers in an Indian's headdress.

c. **Buttons.** At the dorsal end of the featherbones are small islands of cartilage. These are called buttons. As the animal ages, these buttons of cartilage gradually calcify, or transform, into bone. Thus, the amount of uncalcified cartilage present is a rough estimation of the animal's age at the time of slaughter. To make this estimation of age, the 10th, 11th, and 12th thoracic chine bones are used. For example: a steer at approximately 18 months of age, will usually have only a few, small, scattered, red pinpoints of bone embedded in the white cartilage of the buttons. These red, pinpoint areas of bone are also termed blood islands.

d. **Sternum.** On the internal ventral aspect of the side is a group of seven bones collectively termed the sternum or breastbone. These bones form the ventral attachment of the rib bones.

e. **Cartilage.** A specialized fibrous, elastic, or hyaline connective tissue found in the carcass. It is normally found on the ends of bones and more frequently in carcasses of young animals. Cartilage ossifies as animals mature, thereby making it an important consideration when determining a carcass' skeletal maturity.

f. **Ossification.** The formation of bone or a bony substance; the conversion of fibrous tissue or cartilage into bone by the deposition of hard mineral material, especially calcium and phosphorus.

1-9. LANDMARK BONES

a. **In the Forequarter/Anterior Section.** On the outside of the forequarter/anterior section and under the shoulder muscles, is the scapula or blade bone. Distal to the scapula is the humerus or arm bone, and distal to the humerus is the radius and ulna or foreshank bones.

b. **In the Hindquarter/Posterior Section.** On the distal end of the hindquarter posterior section are the tibia and fibula or hind shank bones. Proximal to this is the femur or round bone.

c. **In the Pelvis.** The femur attaches to the pelvis or os coxae, which is composed of three fused bones: the ilium or pin bone; the ischium or hookbone; and

the pubis or aitch bone. A portion of the pubis is exposed when a beef carcass is split into sides. The split is through the symphysis pubis. The exposed portion of the pubis is known as the aitch bone.

1-10. GENERAL TERMS

General red meat terms with which the veterinary food inspection specialist must be familiar are listed and described below.

- a. **Red Meats.** Beef, pork, veal, lamb, and calf are considered red meats.
- b. **Bovine.** Of, relating to, or like an animal of the genus Bos, for example a cow or ox.
- c. **Ovine.** Of, resembling, or characteristic of sheep.
- d. **Porcine.** Of or similar to swine or pig.

1-11. CARCASS TERMS

- a. **Carcass.** A carcass is a slaughtered animal after the removal of the head, hide, and viscera. The dressed and eviscerated carcass is limited to two sides derived from the same animal.
- b. **Packer Style.** A carcass without the head, kidneys and practically free of internal fat.
- c. **Sides.** The dressed and eviscerated carcass is split on the kill floor through the center of the spinal column. This cut divides the carcass into two equal halves or sides. Normally beef and pork carcasses are split into sides, but ovine, veal and calf carcasses may or may not be split.
- d. **Serous Membrane.** The serous membrane lines all of the body cavities, which do not open to the outside. The plate, flank, and skirt are examples of cuts of beef that are covered with serous membrane.
- e. **Stifle Joint.** This is the juncture of the distal end of the femur and the proximal end of the tibia/fibula and the patella. It is the joint between the hip and the hock. The stifle joint corresponds to the human knee.
- f. **Periosteum.** Around the bone; a thin tough connective tissue that covers the outer surface of bones. During boning it may stay attached to the lean or it may adhere to the bone. Two places it can be found are the medial surface of the beef clod and sirloin butt.

g. **Connective Tissue.** This is fibrous tissue that supports and connects other tissues of an animal body.

h. **Fascia.** This is the sheet or band of fibrous connective tissue that forms an envelope for muscles or organs.

i. **Cartilaginous Juncture.** This is the junction of the first rib and anterior extremity of the sternum.

j. **Costal Cartilage.** This is the cartilage that attaches the distal end of the rib to the sternum.

k. **Marbling.** The fat deposited within the muscle fibers is called marbling. It is an important factor that affects the quality of meat. Marbling enhances the palatability by increasing juiciness and flavor.

l. **Channel Fat.** Adipose tissue located on the ventral side of thoracic vertebrae of beef chucks, beef ribs, and pork loins.

m. **Finish.** The amount of fat the animal had at the time of slaughter.

n. **Viscera.** The internal organs and glands contained in the thoracic and abdominal cavities are called viscera.

o. **Offal.** Organs of a food animal.

(1) Edible offal. The liver, tongue, heart, kidneys, pancreas, spleen, testicles, brain, thymus gland, beef blood, beef tails, skirt (diaphragm), and spleen are usually classed as edible offal.

(2) Inedible offal. The stomach and intestines are usually classed as 'green' offal. They may then be processed to become edible offal. Bone and lungs are inedible offal; these are not used for human food.

p. **Oyster.** The connective tissue and fat that lies on the medial side of the aitch bone.

q. **Purge.** The juices exuded from fresh, cooked, or cured meat cuts. These juices may be found in product containers.

1-12. BODY CAVITY TERMS

a. **Thoracic Cavity.** The thoracic cavity or chest cavity is the hollow area of the carcass that is bound by the ribs, sternum, neck area, and diaphragm or skirt. Within this hollow space, or cavity, in the live animal are the lungs, heart, mediastinal lymph nodes, and heart fat.

(1) Heart fat. The mediastinal fat, or heart fat, is located on the ventral floor of the thoracic cavity where the heart was located.

(2) Intercostal. Situated, positioned, or attached between the ribs.

(3) Feathering. The fat deposits lying beneath the pleura and between the intercostal muscle bundles.

(4) Festooning. The fat deposited on the internal surface of the thoracic cavity.

(5) Diaphragm/skirt. The diaphragm or skirt is the flat muscle that separates the thoracic cavity from the abdominal cavity. This is the muscle which, when contracted, allows the thoracic cavity to expand and bring air into the lungs. The skirt is completely covered with serous membrane.

(6) Hanging tender. The hanging tender consists of the remains of the pillars of the diaphragm located in the lumbar region.

b. Abdominal and Pelvic Cavities. The abdomen is the largest cavity in the body. The abdominal and pelvic cavities are hollows or spaces on the inside of the carcass below the thoracic cavity. They are considered two cavities though they are not separated from each other. These cavities contained the digestive and reproductive organs in the live animal.

(1) Kidney knob. The kidney knob is a large glob of fat and an encased kidney; it is located in the lumbar region of the abdominal cavity.

(2) Flank pocket. This is the internal surface of the abdominal cavity or flank, at the posterior end is the flank pocket formed by the folding over of the flank. This is an area of concern since it is a site of early deterioration due to the lack of air circulation.

(3) Hanging tender. Just anterior and dorsal to the kidney knob is the hanging tender, or pillar of the diaphragm. This is the muscular attachment of the skirt.

(4) Abdominal tunic. This is the heavy sheet of connective tissue between the flank muscles.

1-13. STATES OF REFRIGERATION

Refrigeration requirements or states of refrigeration are described in the inspection data packet. There are two states of refrigeration, chilled or frozen.

a. **Chilled.** Meat products that have an internal temperature greater than 28°F (-2.2°C) and are held under refrigerated storage temperatures are considered chilled. The optimum temperature range of chilled meat is 32°F (0°C) to 40°F (4.4°C).

b. **Frozen.** Meat products that have an internal temperature of less than 0°F (-17.8°C) and are stored at less than 0°F (-17.8°C) are considered frozen.

1-14. CONDITION TERMS

a. **General.** Condition is a determination that the meat item is fresh and wholesome and that the packaging and packing is in such condition as to protect the product during storage and distribution. For all meat items that are purchased for military use, only meat that is in excellent condition will be considered. The Office of the Surgeon General has defined excellent condition as “meat that has a degree of freshness exhibited by meat maintained at an optimum temperature of 32° -40°F (0°--4.4°C) and normally, the product will not be more than ten days old from the date of slaughter.” However, the final determination of excellent condition shall be based on product characteristics. The meat should also be firm and dry, and show no evidence of freezing or storage at temperatures above 40°F (4.4°C). Small, easily trimmed areas of darkening, discoloration, or dehydration is allowed. Meat showing moderate or severe deterioration is not in excellent condition. The veterinary food inspection specialist performs this inspection by visual, tactile, and olfactory examination.

NOTE: Normally examination for condition is performed in conjunction with the identity inspection.

b. **Bloom.** The oxygenation process meat undergoes when exposed to air is called bloom. It is particularly important in the beef grading process and condition examination of previously vacuum-packed product.

c. **Cryovac.** The term utilized for a packaging method. The product is placed in a heavy-gauged plastic bag. A vacuum is pulled. The bag is then sealed and subjected to a heat-shrinking process; the bag shrinks to fit tightly against the product. If bone-in cuts are packaged in a Cryovac bag, a bone protector consisting of a reinforced cloth strip is placed over the bones to prevent puncture of the plastic bag.

d. **Unacceptable Conditions.** All red meats, the carcass, wholesale cuts, and portion-cut items are examined for any abnormalities, such as those listed below:

(1) Dark cutter. A dark cutter has a high pH and low muscle glycogen, which is the most notable characteristic of dark-cutting beef. It is generally accepted that dark-cutting beef results from a glycogen deficiency in the muscle at the time of slaughter. Subjecting cattle to extreme or sustained stress prior to slaughter may cause this condition. It can be detected only after ribbing down of the carcass; the color of the lean tissue of the loin can range from a dull, darker red than normal to black and feels soft and gummy.

(2) Spotter beef. Spotter beef or agonal hemorrhages are normally seen in feedlot cattle and not in range or dairy cattle. The cause is not known, but could be from several factors. It is believed that the capillaries rupture during the agony of violent death. There will be blood spots in the muscle tissue, they are most commonly found in the eye of the loin (visible after ribbing).

(3) Fired beef. The peripheral capillaries have not drained when bled. This can be caused by undue excitement or overheating just prior to slaughter. Red streaks or areas are apparent on the external surface of the dressed carcass.

(4) Sore or scar. Cattle grubs migrate to the back of the bovine and settle just under the skin to develop from one intermediate stage into another. If you observe an active site, it is termed a sore and is a small, whitish, water spot in the eye of the loin/rib. If it is an old, inactive site filled with scar tissue, it is termed a scar. Of course, there are many other causes of scar tissue.

(5) Blistering. When beef carcasses are crowded into a cooler so that they are touching, a bleached, slimy area appears at the points of contact, this occurs because of a lack of proper cooling due to impaired air circulation.

(6) Pale, soft, and exudative. Pale, soft, and exudative (PSE) is a common color change results from the porcine stress syndrome (PSS), where animals with genetic susceptibility to stress react adversely to shipping and handling before slaughter. This condition results in low eating quality though it is wholesome. The color is a very pale washed-out pink, which quickly turns gray or even greenish-gray in the retail display. These cuts will also be soft and will lose excessive amounts of water from the muscle; which causes watery exudates to form puddles on and around the cut. The PSS condition can also result in a dark muscle color; the product is dark, firm, and dry (DFD) and the pork muscle is dark red in color. DFD is less common than the pale color of PSE.

(7) Bruises. Bruises are the result of blood infiltrating an area of meat. The type of tissue and degree of infiltration determines whether a bruise is a major or minor defect. Superficial bruises are minor unless they are on the better cuts. All bruises are objectionable because they support the growth of harmful microorganisms and are not aesthetically acceptable. A bruise is evidenced by darkened flesh.

(8) Deep cut or score. Cuts and scores less than 1/2 inch in depth and less than 2 inches in length are usually not considered. A deep cut or score that is in a major wholesale cut and penetrates the lean from the original lean surface in such a manner that it will interfere with the production of retail cuts will not be acceptable.

e. **Off-Condition Examples**. With the passage of time and/or improper holding temperatures, the microorganisms naturally present on the surface of a carcass begin to multiply and cause the following conditions.

(1) Abnormal texture. The cut surfaces of the lean tissue should be smooth, not rough or grainy.

(a) Stickiness or tackiness is an off-condition in which the meat is slightly adhesive or gummy to the touch. By placing your hand on the carcass and then removing it slowly, a gluey, sticky feeling is evident which tries to prevent your hand from being released from the surface.

(b) Slime is a thick liquid, normally yellowish to greenish in color on the surface of the meat. It is normally sticky to the touch and has a putrid odor. Slime is an indicator of advanced deterioration caused by bacteria.

(c) The external surface should be fairly dry without being “dried out.” Excessive moisture, usually referred to as a “sweating” condition, is caused by meat being held outside the proper temperature range.

(2) Abnormal odor (off-odor). Meat and meat products should have odors characteristic of that product. Usually by the time stickiness or slime occurs, a distinct off-odor can be smelled. It may smell sour, rancid, or putrid, depending on the amount of microbial action that has occurred and whether lean or fat is being attacked. Uncharacteristic odors such as fish or gasoline should not be present. Cryovac beef possesses a smothered odor. After prepackaged Cryovac beef has been opened, the product should be aired (no more than 30 minutes); practically normal odor should then return. Off-odor is determined by touching the surface of the product and then smelling your hand to determine if an off-odor is present.

(3) Abnormal color/discoloration (off-color). The fat or lean meat must have a color typical of the product. Frozen meat will have a dull, darker appearance. See The Meat Buyer's Guide, published by the North American Meat Processors Association, for color photographs that illustrate the normal color of beef, pork, lamb, and veal.

(a) Dehydration is evidenced by dark, dry, rough-looking meat.

(b) Abnormal liquid in the bag or can is evidenced by excessive liquid. The liquid (composed of blood and juices) should be dark red in color. In the case of Cryovac beef, some darkening of the liquid is normal and the meat may be a purplish, gray color. After prepackaged beef has been opened, the product should be aired for no more than 30 minutes; practically normal color should then return. Juices are normally gelatinized in canned hams. If they are found as a liquid, there is cause for concern. Freezing and defrosting of a product will result in a liquefied gelatin.

(c) Freezer burn is evidenced by abnormal color that may range from white to amber in affected areas. It is a result of improper humidity in a storage area.

(d) Mold may grow when the product is contaminated. Size, color, and appearance vary from thin, white, powdery growths to long, thin, hair-like growths, greenish or white in color.

(e) Excessive frost is indicated by ice crystals on the product or in the packaging and is a sign of improper storage temperatures.

(f) Surface fat discoloration is an unacceptable condition.

1 The fat on grain-fed steers and heifers is firm, brittle, and creamy white; that of grass-fed animals is soft, plastic, and yellow. Certain breeds of dairy cattle and most scrub cattle have yellow fat, and, as the cattle get older, there is a marked increase in the amount of yellow pigment (carotene) present. Almost any off-color is possible on the surface of a beef carcass.

2 The type of feed the hog was fed influences the fat. The hogs fed garbage, peanuts, acorns, and soybeans have a low quality, soft, oily, yellowish fat with a low melting point. This fat is not resistant to finger pressure. Hogs fed corn and other grains have a high quality fat that is hard, white, and resists bending and finger pressure.

3 Lamb fat is lighter than mutton; as the sheep ages the fat darkens.

(g) Discoloration of the flesh is an unacceptable condition. Frozen meat is normally darker than fresh meat.

1 The color of beef normally ranges from a light, bright red to a dark red. Almost any off-color is possible on the surface of a beef carcass. Discoloration in portion-cut or processed beef is evidenced by, but not restricted to, an intense dark red, green, black, purple, or dark brown color of the meat.

2 The color of pork ranges from a light pink or grayish-pink to light red. A slight two-toned color is permissible in pork. Discoloration in pork is evidenced by, but not restricted to, an intense dark red, green, black, purple, or dark brown color of the meat.

3 The color of meat in lamb is pinkish. As the animal ages the flesh darkens and is reddish in color. Discoloration in lamb is evidenced by, but not restricted to, an intense dark red, green, black, purple, or dark brown color of the meat.

4 The color of veal differs depending on whether it is milk-fed or grain-fed. Milk-fed veal is a whitish or grayish-pink and grain-fed veal is pink. Discoloration in veal is evidenced by, but not restricted to, an intense dark red, green, black, purple, or dark brown color of the meat.

(4) Foreign material. Foreign material is any extraneous material which does not organically belong where found, which has been introduced from the outside, or which does not naturally occur in the quantity found at the location examined. Dirt, animal hair, slivers of metal or glass, and insects are examples of foreign material.

(5) Deep cuts and scores. Cuts and scores less than 1/2 inch (12.70 mm) in depth and less than 2 inches (50.8 mm) in length are usually not considered. A deep cut or score that is in a major wholesale cut and penetrates the lean from the original lean surface in such a manner that it would interfere with the production of retail cuts would not be acceptable.

(6) Blood clot. A blood clot is an organized, opaque, coagulated mass on the surface of fat or muscle tissue.

Section III. WHOLESOMENESS

1-15. INSPECTION LEGEND

a. **General**. Inspection of all meat and poultry for wholesomeness is mandatory in CONUS and is paid for out of tax dollars. The Food Safety and Inspection Service (FSIS), the public health agency in the USDA, performs this inspection; they ensure that meat and poultry products are safe, wholesome, and correctly labeled and packaged. Inspection and grading are two separate programs.

b. **Inspection Legend**. This is indicated by the USDA inspection legend (a round purple stamp) placed directly on the carcass and major cuts or on the marked end of a sealed container (packing). The mark, stamped on a meat carcass is comprised of a food-grade vegetable dye and is not harmful. The stamp differs slightly depending on the product. All inspection legends have a number in the brand or just outside the brand, that number represents the plant where the meat was processed. The number references a specific plant that is listed with the establishments name and address in the USDA Meat and Poultry Inspection Directory. The veterinary food inspection specialist must verify that the inspection legend is present. Figure 1-3 below shows examples of the various inspection legends.

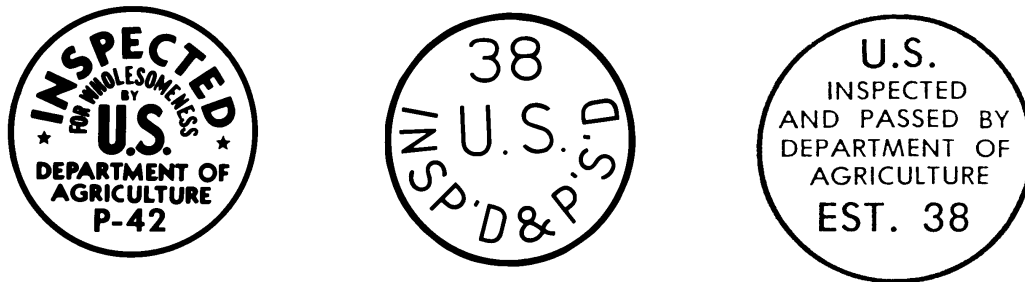


Figure 1-3. Inspection legends

Section IV. REFERENCES

1-16. STANDARD REFERENCES

There are two standard references that are used when inspecting red meats for identity. Use the reference identified in the inspection data packet (IDP), the other reference can be helpful and used as a guide to assist in determining gross identity.

a. **Institutional Meat Purchase Specifications.** Institutional Meat Purchase Specifications (IMPS) was developed and is maintained by the USDA's Agricultural Marketing Service (AMS). The IMPS item number series corresponds to a specific animal and a particular cut from that animal. The requirements for the product, fat limitations, portion cut weight and thickness, and bone exclusion are listed and the method by which it was derived from the carcass. Purchaser Specified Options (PSO) are options and modifications to an IMPS item number that allow the purchaser to for example add ingredients, have an item cut a certain way, or maximum surface fat restrictions. This document or a modified version is normally used at commissaries. To access this document from the World Wide Web: <http://www.ams.usda.gov/lsg/stand/imps.htm>. The IMPS consists of 10 documents, they are as follows:

- (1) General Requirements
- (2) Quality Assurance Provisions
- (3) Series 100–Fresh Beef
- (4) Series 200–Fresh Lamb and Mutton
- (5) Series 300–Fresh Veal and Calf
- (6) Series 400–Fresh Pork
- (7) Series 500–Cured, Cured & Smoked, & Fully Cooked Pork Products
- (8) Series 600–Cured, Dried, and Smoked Beef Products
- (9) Series 700–Edible By-Products
- (10) Series 800–Sausage Products

b. **The Meat Buyer's Guide.** The Meat Buyer's Guide, published by the North American Meat Processors Association (NAMP) is based upon the United States Department of Agriculture's (USDA) Institutional Meat Purchase Specifications (IMPS). This reference contains a glossary of terms, trim/quality information, product name with

item number and product description, weight ranges, color photographs of beef, pork, lamb, veal, and further-processed/by-products, and labeled color photographs that depict the separation points of primal cuts with the muscles identified. This is the standard reference that is used to order meat by grocery stores in the civilian sector. To access the NAMPs from the World Wide Web: <http://www.namp.com/index.html>.

1-17. ADDITIONAL REFERENCES

There are many other reference materials available, listed below are a some resources that may provide assistance:

- a. A Cross Sectional Muscle Nomenclature of the Beef Carcass, H.G. Tucker, et. al., Michigan State University, East Lansing, MI.
- b. Porcine Myology, R.G. Kauffman and L.E. St. Clair, University of Illinois College of Agriculture, Urbana, IL.
- c. Ovine Myology, R.G. Kauffman and L.E. St. Clair, and R.J. Reber.
- d. <http://porcine.unl.edu>
- e. United States Standards for Grades of Carcass Beef.
- f. United States Standards for Grades of Pork Carcasses.
- g. United States Standards for Grades of Veal and Calf Carcasses.
- h. United States Standards for Grades of Lamb, Yearling Mutton, and Mutton Carcasses.
- i. United States Standards for Grades of Feeder Cattle.
- j. United States Standards for Grades of Slaughter Cattle.
- k. United States Standards for Grades of Feeder Pigs.
- l. United States Standards for Grades of Slaughter Swine.
- m. United States Standards for Grades of Slaughter Lambs, Yearlings, and Sheep.
- n. United States Standards for Grades of Vealers and Slaughter Calves.

Continue with Exercises

EXERCISES, LESSON 1

INSTRUCTIONS. The following exercises are to be answered by marking the lettered response that best answers the question or completes the incomplete statement, or by writing the answer in the space provided.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers.

1. _____ inspection is performed before the animal is slaughtered.
2. Antemortem and postmortem inspections are performed to make certain the meat is _____.
3. Match the anatomical term of location in Column I with its definition in Column II.

COLUMN I

- (1) ____ Dorsal
- (2) ____ Distal
- (3) ____ Anterior
- (4) ____ Posterior
- (5) ____ Ventral
- (6) ____ Medial
- (7) ____ Lateral
- (8) ____ Proximal

COLUMN II

- a. Toward the head
- b. Nearest the long axis of the body
- c. Away from the supporting surface
- d. Toward the rear of the animal
- e. Farthest from the long axis of the body
- f. Toward supporting surface
- g. External or outward
- h. Internal or inward

4. The _____ is proximal to the tibia.
5. The foreshank is distal to the _____.
6. The "back side" is the _____ side.

7. The “median plane” is directed _____ or _____.
8. Bones are divided into _____ according to their _____.
9. The vertebrae are an example of _____ bones.
10. How many rib bones are there in cattle? _____.
11. An example of a flat bone is the:
 - a. Pubis.
 - b. Tarsus.
 - c. Lumbar vertebrae.
 - d. Carpus.
12. Fill in the blank with the number of bones in the vertebrae of cattle.
 - a. Cervical vertebrae ____ .
 - b. Thoracic vertebrae ____.
 - c. Lumbar vertebrae ____.
 - d. Sacral vertebrae ____.
 - e. Coccygeal vertebrae ____.
13. Fill in the blank with the number of bones in the vertebrae of pigs.
 - a. Cervical vertebrae ____.
 - b. Thoracic vertebrae ____.
 - c. Lumbar vertebrae ____.
 - d. Sacral vertebrae ____.
 - e. Coccygeal vertebrae ____.

14. Match the common name in Column I to the scientific name in Column II.

COLUMN I

COLUMN II

(1) ____ Backbones

a. Cervical vertebrae

(2) ____ Tail bones

b. Thoracic vertebrae

(3) ____ Neck bones

c. Lumbar vertebrae

(4) ____ Loin bones

d. Sacral vertebrae

(5) ____ Rump bones

e. Coccygeal vertebrae

15. Match the common name of bones in Column II to the scientific name in Column I. Items in Column II may be used more than once.

COLUMN I

COLUMN II

(1) ____ Scapula

a. Foreshank

(2) ____ Humerus

b. Elbow

(3) ____ Radius

c. Armbone

(4) ____ Ulna

d. Blade bone

(5) ____ Olecranon

16. Match the common name of bones in Column II to the scientific name in Column I. Items in Column II may be used more than once.

COLUMN I

COLUMN II

(1) ____ Femur

a. Hind shank

(2) ____ Patella

b. Round bone

(3) ____ Tibia

c. Kneecap

(4) ____ Fibula

d. Hip bone

(5) ____ Tuber coxae

17. Match the bones common name in Column II to the scientific name in Column I.

COLUMN I

COLUMN II

(1) ____ Os coxae

a. Pin bone

(2) Ilium

b. Hookbone

(3) Ischium

c. Aitch bone

(4) Pubis

d. Pelvis

18. The split bodies of the vertebrae are termed _____.

19. The split dorsal processes of the thoracic vertebrae are called _____.

20. The islands of cartilage at the dorsal ends of the featherbones are called _____.

21. Red, pinpoint areas of bone are termed _____. They are embedded in the white cartilage of the buttons at 18 months of age.

22. To determine maturity or age of beef, the inspector will normally examine which of the following structures?

a. Aitch bone.

b. Color of fat.

c. Conformation.

d. Condition of buttons in area of the 10th through 12th thoracic vertebrae.

23. After head, hide, and viscera removal a slaughtered animal is known as a _____.

24. A slaughtered animal is divided into two equal halves or _____.

25. The beef carcass is split through the center of the _____.
26. The _____ lines all body cavities.
27. The fat deposited within the muscle fibers is called _____.
28. _____ is the amount of fat the animal had at time of slaughter.
29. _____ is the juices exuded from fresh, cooked, or cured meats.
30. Match each term in Column I to the definition in Column II.

COLUMN I

COLUMN II

- | | |
|---------------------------|--|
| (1) _____ Mediastinal fat | a. Tissue found on the ventral floor of the thoracic cavity where the heart was located. |
| (2) _____ Hanging tender | b. Flat muscle that separates the thoracic cavity from the abdominal cavity. |
| (3) _____ Thoracic cavity | c. Muscular attachment of the skirt. Also known as the pillar of the diaphragm. |
| (4) _____ Diaphragm | d. Hollow area on the inside of the forequarter. |
31. Chilled meat must be refrigerated at a suitable temperature, between _____° and _____° Fahrenheit.
32. The internal temperature of frozen meat should not be higher than _____° Fahrenheit at the time of shipment.
33. _____ is the oxygenation process meat undergoes when exposed to air.

34. Cryovac is a _____ method.
35. If you observe an inactive site of cattle grubs, it is termed:
- A sore.
 - A bruise.
 - A scar.
 - Spotter beef.
36. The condition that results in low eating quality pork though the meat is wholesome is called _____.

37. Match each term in Column I to its definition in Column II.

COLUMN I

COLUMN II

(1) _____ Discoloration

a. A gluey, sticky feeling evident on the surface of the carcass.

(2) _____ Stickiness

b. Any off-color not normal to the product.

(3) _____ Fired beef

c. Rancid or sour smell.

(4) _____ Off-odor

d. Red streaks on the external surface of the dressed carcass.

38. Cuts and scores that are less than _____ inches in length and _____ inches in depth are not usually considered as defects.
39. _____ is evidenced by abnormal color that may range from white to amber in affected areas.
40. _____ are an indicator that a product has been improperly stored.

41. Match the term in Column I to the definition in Column II.

COLUMN I

COLUMN II

- | | |
|-----------------------|---|
| (1) ____ Spotter beef | a. Very dark red to black lean tissue, caused by glycogen deficiency in the muscle. |
| (2) ____ Bruise | b. An active site of a cattle grub on the back of the bovine. |
| (3) ____ Sore | c. Muscle tissue with blood spots caused by rupture of the capillaries. |
| (4) ____ Blistering | d. Blood infiltration of the meat, evidenced by darkened flesh. |
| (5) ____ Dark cutter | e. Bleached, slimy area(s) on the meat at the point of contact with some other beef carcass during storage. |

42. Any extraneous material which does not organically belong where found or has been introduced from the outside is considered _____ .

43. Which agency is responsible for inspecting all meat and poultry for wholesomeness?

- a. USDA AMS.
- b. USDA FSIS.
- c. USDC.
- d. USPS.

44. The _____ is used to find an establishments name and address.

45. The USDA inspection legend that shows a product was inspected for wholesomeness is represented by a stamp in the shape of a shield?
- a. True.
 - b. False
46. The inspection legend for wholesomeness is not required on utility carcass beef?
- a. True.
 - b. False.
47. Inspection and grading are the same?
- a. True.
 - b. False.
48. Which agency is responsible for maintaining the Institutional Meat Purchase Specifications?
- a. FSIS
 - b. USDC
 - c. USDA
 - d. USPS
49. The Institutional Meat Purchase Specifications contains _____ documents.
50. The title of the standard reference used in the civilian sector to order meat for civilian grocery store is called The _____ by the North American Meat Processors Association.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 1

1. Antemortem (para 1-2a)
2. Fit for human consumption (para 1-5a)
3. (1) c (para 1-6b)
(2) e (para 1-6i)
(3) a (para 1-6c)
(4) d (para 1-6d)
(5) f (para 1-6a)
(6) h (para 1-6f)
(7) g (para 1-6g)
(8) b (para 1-6h)
4. femur (para 1-6h)
5. elbow (para 1-6i)
6. dorsal (para 1-6b)
7. inward, internal (para 1-6f)
8. classes, shape (para 1-7a)
9. irregular (para 1-7a(4))
10. 13 pairs (para 1-7b(6))
11. a (para 1-7a(2))
12. a. 7 (paras 1-7c(1))
b. 13 (paras 1-7c(1))
c. 6 (paras 1-7c(1))
d. 5 (paras 1-7c(1))
e. 18 to 21 (paras 1-7c(1))
13. a. 7 (paras 1-7c(3))
b. 14 to 15 (paras 1-7c(3))
c. 6 to 7 (paras 1-7c(3))
d. 4 (paras 1-7c(3))
e. 20 to 23 (paras 1-7c(3))

14. (1) b (para 1-7b(2))
(2) e (para 1-7b(5))
(3) a (para 1-7b(1))
(4) c (para 1-7b(3))
(5) d (para 1-7b(4))
15. (1) d (para 1-7b(7))
(2) c (para 1-7b(8))
(3) a (para 1-7b(9))
(4) a (para 1-7b(9))
(5) b (para 1-7b(10))
16. (1) b (para 1-7b(11))
(2) c (para 1-7b(12))
(3) a (para 1-7b(13))
(4) a (para 1-7b(13))
(5) d (para 1-7b(14))
17. (1) d (para 1-9c)
(2) a (para 1-9c)
(3) b (para 1-9c)
(4) c (para 1-9c)
18. chine bones (para 1-8a)
19. featherbones (para 1-8b)
20. buttons (para 1-8c)
21. blood islands (para 1-8c)
22. d (para 1-8c)
23. carcass (para 1-11a)
24. sides (para 1-11c)
25. spinal column (para 1-11c)
26. serous membrane (para 1-11d)
27. marbling (para 1-11k)
28. finish para 1-11m)

29. purge (para 1-11q)
30. (1) a (para 1-12a(1))
(2) c (para 1-12a(6))
(3) d (para 1-12a)
(4) b (para 1-12a(5))
31. 32, 40 (para 1-13a)
32. 0 (para 1-13b)
33. bloom (para 1-14b)
34. packaging (para 1-14c)
35. c (para 1-14d(4))
36. pale, soft, and exudative (para 1-14d(6))
37. (1) b (para 1-14e(3))
(2) a (para 1-14e(1)(a))
(3) d (para 1-14d(3))
(4) c (para 1-14e(2))
38. 2, 1/2 (para 1-14e(5))
39. freezer burn (para 1-14e(3)(c))
40. ice crystals (para 1-14e(3)(e))
41. (1) c (para 1-14d(2))
(2) d (para 1-14d(7))
(3) b (para 1-14d(4))
(4) e (para 1-14d(5))
(5) a (para 1-14d(1))
42. foreign material (para 1-14e(4))
43. b (para 1-15a)
44. USDA Meat and Poultry Inspection Directory (para 1-15b)
45. b (para 1-15b)
46. b (para 1-15b)

- 47. b (para 1-15b)
- 48. c (para 1-16a)
- 49. 10 (para 1-16a)
- 50. Meat Buyers Guide (para 1-16b)

End of Lesson 1

LESSON ASSIGNMENT

LESSON 2

Introduction to Beef.

LESSON ASSIGNMENT

Paragraphs 2-1 through 2-5.

LESSON OBJECTIVES

After completing this lesson you should be able to:

- 2-1. Identify terms associated with beef.
- 2-2. Identify classes of beef carcasses.
- 2-3. Identify factors for sex determination.
- 2-4. Identify quality grades and grade factors.
- 2-5. Identify yield grade groups.

SUGGESTION

After studying the assignment, complete the exercises of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 2

INTRODUCTION TO BEEF

Section I. GENERAL KNOWLEDGE

2-1. TERMS

Listed below are important terms with which the inspector must be familiar.

a. **The State of Refrigeration.** Carcasses have terms denoting their state of refrigeration. Hot carcass beef is beef just after slaughter that retains most of its original body temperature (about 100°F). After slaughter, the hot carcasses are placed in refrigerated rooms for about 48 hours until their internal core temperature is below 38°F (3.4°C). Then the carcasses are termed chilled carcass beef. Subsequently, if chilled carcasses are placed in freezers and the internal temperature is decreased to less than 0°F (-17.8°C), the carcasses are termed frozen carcass beef. Note that beef freezes at 28°F (-2.2°C) unlike water that freezes at 32°F (0°C). State of refrigeration requirements and information, such as freezing options are listed in the General Requirements of the Institutional Meat Purchase Specifications.

b. **Primal/Wholesale Cuts.** The primal or wholesale cuts of beef are the square cut chuck, rib, short loin, sirloin, round, foreshank, brisket, plate, and flank.

c. **Sub-Primal Cuts.** The subdivision of primal cuts. Sub-primal cuts can be further divided into portion-cuts.

d. **Quarters and Their Weight.** The landmark for dividing a side of beef is between the 12th and 13th ribs. The resulting two pieces are termed quarters. The anterior quarter is known as the forequarter, and comprises 52 percent of the weight of the (trimmed) side. The posterior quarter is known as the hindquarter, and comprises 48 percent of the weight of the (trimmed) side.

e. **Ribbing Down.** Ribbing down is the process of dividing the side of beef into a forequarter and hindquarter, though this procedure does not completely separate the quarters. This is accomplished by cutting through the back, splitting the 12th thoracic vertebra in half, completing the cut between the 12th and 13th rib, and exposing the eye of beef. All carcasses should be ribbed down before being accepted in order to expose a cross section of the rib eye muscle and backbone so that it can be assigned a grade designation.

f. **Beef Forequarter.** The forequarter is the anterior portion of the beef side remaining after severance from the hindquarter and contains the 1st to the 12th rib, inclusive.

g. **Beef Hindquarter.** The hindquarter is the posterior portion of the beef side remaining after severance at the 12th rib from the forequarter. The 13th rib remains in the hindquarter.

h. **Eye of Beef.** This is the cross-cut surface of the back muscle (longissimus dorsi), which is exposed when the side of beef is ribbed down. The cross section can be seen on either quarter and provides the inspector with information about the thickness of meat, thickness of the covering, color and texture of meat, the amount of marbling, and presence of defects.

i. **Open Beef Side.** The open beef side is the left side. It is called this because of the loose attachment of the kidney knob in the lumbar region, which leaves a space between the kidney knob and the flesh beneath.

j. **Closed Beef Side.** The closed beef side is the right side. It is called this because of the close attachment of the kidney knob in the lumbar region. The kidney knob hangs lower on the right side than on the left side. In the packing industry, the right side is referred to as the tight side.

k. **Exposed Surface of Lean Tissue.** When beef carcasses are split into sides and ribbed, the gracilis, brisket, neck, and rib eye muscles are exposed. Exposed muscle tissue (lean meat) deteriorates much faster than when it is covered with fat.

2-2. FOREQUARTER TERMS

In addition to the terms in paragraph 2-1, the following terms are applicable to a beef forequarter.

a. **Jugular Furrow / Groove.** Towards the anterior, or front aspect of the forequarter, there is a groove between the neck muscles in which the esophagus, trachea, and blood vessels were found in the live animal. This groove is called the jugular furrow.

b. **Foreshank and Shoulder Rose Muscle.** On the outside of the forequarter there are two areas of concern. The first is the foreshank, comprised of the foreshank muscles and the foreshank bones (radius and ulna). The second is the shoulder rose muscle, the thin, pink to red cutaneous muscle lying over the outside of the shoulder and ribs.

c. **Rib Eye Muscle.** At the separation of the forequarter from the hindquarter between the 12th and 13th ribs, there is a large exposed muscle called the rib eye muscle (longissimus dorsi). This muscle is important since the quality of the carcass is determined, for the most part, according to the characteristics in and around this muscle, this will be discussed in paragraph 2-5.

d. **Diaphragm/Skirt.** The diaphragm or skirt is the flat muscle that separates the thoracic cavity from the abdominal cavity. This is the muscle which, when contracted, allows the thoracic cavity to expand and bring air into the lungs. The skirt is completely covered with serous membrane.

e. **Kidney Knob.** The kidney knob is a large glob of fat and an encased kidney; it is located in the lumbar region of the abdominal cavity.

2-3. HINDQUARTER TERMS

In addition to the terms in paragraphs 2-1 and 2-2, the following terms are applicable to a beef hindquarter.

a. **Flank Pocket.** This is the internal surface of the abdominal cavity or flank, at the posterior end is the flank pocket formed by the folding over of the flank. This is an area of concern since it is a site of early deterioration due to the lack of air circulation.

b. **Hind Shank and Gambrel Cord.** On the distal end of the hindquarter we have the hind shank. It contains both the hind shank muscles and the hind shank bones (tibia and fibula). Also in the hind shank is the Achilles tendon or gambrel cord, which attaches the gastrocnemius (heel) muscle to the anklebone. It is behind this tendon that the slaughtering plant passes a metal hook, called a gambrel hook, in order to hang the side or hindquarter from the meat rail.

c. **Gracilis Muscle.** On the inside of the hindquarter along the median plane, and adjacent to the aitch bone (pubis) is the exposed, cut surface of the gracilis muscle. Its importance will be discussed in the next section under the topics of sex determination (paragraphs 2-4).

Section II. GRADING OF BEEF

2-4. SEX TERMS

The inspector must be able to distinguish the sex of a beef carcass because the inspection data packet will often specify steers or heifers. If it is not specified, either is acceptable. The military does not purchase bulls, cows, or bullocks.

a. **Five Classes of Carcasses.** The sex of a carcass falls within one of five classes, depending on the maturity and apparent sex condition at the time of slaughter.

(1) Steer. A steer is a male bovine that was castrated (had his testicles removed) prior to reaching sexual maturity (puberty) and has characteristics of youth such as red bones, buttons, and slight ossification of the sacral vertebrae. On steers, the cod fat is rough and knobby and the gracilis muscle is somewhat triangular in shape. The aitch bone terminates into lean at the dorsal posterior tip ("bone to lean"). The steer has a smaller neck than a stag or bull, a less pronounced pizzle eye, and more cod fat.

(2) Bull. A bull is a mature male bovine that has not been castrated and that possesses secondary sex characteristics, such as heavy bone and muscling, neck-crest, and deep voice. Bulls are used in making sausage, but are not procured for troop consumption.

(3) Bullock. A bullock is a bull that was accidentally or intentionally castrated after reaching maturity. Stag was the term used for bullock. Bullocks are used in making sausage, but are not procured for troop consumption.

(4) Cow. A cow is a female bovine that has given birth to a calf. Cows are not normally marketed until they are no longer useful for milking or breeding. The bones are hard; the ribs are flat and bowed; and the pelvic cavity is large, since it increases in size with each birth of a calf. The aitch bone is straight or slightly curved.

(5) Heifer. A heifer is a female bovine that has not yet given birth to a calf. It can be identified by a smooth, firm udder, and a relatively small pelvic cavity. The udder fat (dug fat) is smooth and oval. The gracilis muscle is kidney bean-shaped. The aitch bone terminates into fat at the dorsal posterior tip ("bone to fat"). The aitch bone is curved with a round knob on the ventral end.

b. Four Factors for Sex Determination. Since a carcass hanging on a rail does not retain its external and internal sex organs (penis, testicles, vulva, uterus, ovaries, udder, and so forth), the inspector must rely on other identifying landmarks to differentiate between males and females. There are four constant factors or criteria for sex determination of carcass beef.

(1) Pizzle eye. The pizzle eye is the ligamentous attachment of the penis to the pelvis and is found only in males. It is located at the posterior end of the aitch bone and appears as a round ball of clear, translucent material with some red fibers in the center.

(2) Bald spot. Another factor associated with males is the presence of the bald spot. Just dorsal to the pizzle eye, there is a small area of exposed lean meat (1 to 4 inches) that is observed only in males. Females will have an outer layer of fat covering this lean tissue. Thus, in males the term "bone to lean" and in females the term "bone to fat" is used, depending on whether this external fat extends over the gracilis muscle and bald spot and touches the aitch bone.

(3) Cod fat or udder fat. The third constant factor is the presence of cod fat in males and udder fat in females.

(a) Cod fat results from the deposition of fat in the scrotum after the male is castrated. Since the empty scrotum contracts unevenly, the fat that is deposited is also uneven and knobby.

(b) Udder fat (dug fat) in young females is the smooth, thick covering of fat in the groin area associated with the fat that is normally present in an immature udder. Older females (cows) will also have a large amount of smooth fat located here as well as some milk producing glandular material. This glandular material will be trimmed away at a later time.

(4) Shape of the gracilis muscle. Lastly, the shape of the gracilis muscle can be used to determine the sex of the carcass. In males, the shape of the muscle is roughly triangular or round. In females, the muscle is oval to kidney bean-shaped.

2-5. BEEF GRADING

The USDA's Agricultural Marketing Service (AMS) Meat Grading and Certification Branch (MGCB) provide the service of grading carcasses; they are the only ones that may apply the official grade marks. The USDA grades are based on nationally uniform Federal standards of quality. The use of the system is entirely voluntary and on a fee-for-service basis. The marks (legends and brand) are applied directly to the carcass and are made from the same edible vegetable dye as the wholesomeness brand. Grading is performed after the hot carcass has been cooled, and ribbed down. Steers, heifers, cows, and bullock carcasses may be graded, for quality only, yield only, a combination of quality and yield, or left ungraded as established by the regulations and as suits the needs of slaughterers and their customers. Steers and heifers are eligible for all designations. Bulls may only be graded Prime, Choice, Select, Standard, and Utility. Cows are eligible for all but the Prime grade and bulls may not be quality graded.

a. **Quality Grades.** Quality grading is a process to estimate the tenderness, juiciness, and flavor of the beef. Carcasses are not trimmed prior to a quality grade and yield grade designation being assigned.

(1) Factors considered. There are two factors considered in determining the grade of beef: quality and age. The quality grade of beef purchased must be as specified in the inspection data packet and the product graded in accordance with the US Standards for Grades of Carcass Beef.

(a) Quality is the more important of the two grading factors and the primary indication of quality is the degree of marbling. Good quality beef has fat streaks, known as marbling, interspersed with the lean meat. Good quality beef has a fine texture and a velvety feel when the fingertips are rubbed lightly over it. The meat is firm to the touch and cherry red. Final determination of grade is dependent upon factors evaluated in the area of the rib eye muscle.

1 The color of beef is usually darkest just after slaughter, and becomes lighter after chilling. When exposed to the air for an hour or more the surface becomes even lighter in color. Extended exposure to air causes the tissue to darken; this is due to drying and oxidation. If beef feels sticky or gummy, retards the passage of the finger over a cut surface, or is dark or purplish in color, it is usually coarse in texture and of inferior quality.

2 The fat on grain-fed steers and heifers is firm, brittle, and creamy white; that of grass-fed animals is soft, plastic, and yellow. Certain breeds of dairy cattle and most scrub cattle have yellow fat, and, as the cattle get older, there is a marked increase in the amount of yellow pigment (carotene) present. The distribution of the fat is called the finish on a carcass. A newborn calf has practically no finish.

a With good feeding in excess of body requirements, fat is deposited on the external surface of the animal as it matures, first on the loin and ribs on each side of the back, then progressively backward over the round, forward over the chuck, and downward over the brisket, short plate, and flank.

b On the internal surface, fat is first deposited around the kidneys and in the lumbar region. This fat finally extends over the internal surfaces of the flank and the ribs. A completely finished carcass also has small rolls of fat on the inner surface of the ribs (festooning) and a feathering of fat in the lean meat between the ribs.

(b) Age is also a factor in determining quality, and can be judged by the color, character, and size of the cut surfaces of the chine bones (vertebrae) and the sacrum after the carcass is split.

1 Bone characteristics change as the animal ages. All bones in newborn calves are soft and red, and the spines of the vertebrae are tipped with white, glistening cartilage called buttons. As the animal grows older, the bones gradually become white and hard, and the cartilage gradually turns to bone; by the time it is 6 years old, the change is complete. The 10th, 11th, and 12th chine bones are used to make an estimation of age. Steers and heifers, which are usually slaughtered at less than 2 years of age, show a considerable amount of redness of bone and white cartilages.

2 The environment influences the rate of ossification. Plains cattle from the Southwest have harder, whiter bones than cattle of the same age raised in the Corn Belt.

3 The breed of the animal is a factor in grading. The size of the bony framework varies among breeds. Animals bred for consumption have a high percentage of meat to bone. Those animals of non-descript breeding usually have a large, angular bony framework, with a much lower percentage of meat to bone.

(2) Grade designation. Grades are specified in accordance with the US Standards for Grades of Carcass Beef. The military procures only choice or select. The grades listed below are in descending order from the highest quality to the lowest quality.

- (a) United States Prime.
- (b) United States Choice.
- (c) United States Select.
- (d) United States Standard.
- (e) United States Commercial.
- (f) United States Utility.
- (g) United States Cutter.
- (h) United States Canner.

(3) Placement of legend. The legend-indicating grade is placed on the forequarter on the rib and chuck, clod and foreshank, the plate, and the brisket. On the hindquarter, the legend is placed on the loin, outside round, inside round, rump, and the flank. There is no legend for cutter and canner grades. In addition, the official grade designations will appear in any one or any combination of the following ways either as shipping container markings or on individual bags or wrapping material. See figure 2-1.

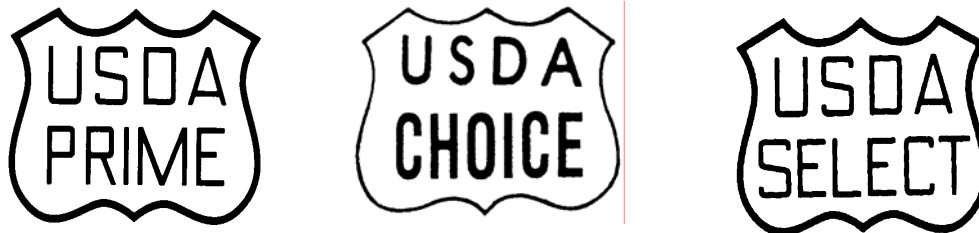


Figure 2-1 Quality grade

b. **Yield Grades.** In yield or cutability grading, we are concerned with an evaluation of the percent of trimmed, major retail cuts to be derived from the carcass. Carcasses are not trimmed prior to a quality grade and yield grade designation being assigned.

(1) There are five yield groups applicable to all classes of beef. The Yield groups are denoted by the numbers 1 through 5. Yield Grade 1, representing the highest degree of cutability (most lean) and Yield Grade 5, representing the lowest degree (most fatty). Acceptable yield grades are 3 or better for military procurement.

(2) After a carcass has been assigned a grade, it must be evaluated for its cutability. This is determined based on the carcass weight, the amount of external fat, the amount of kidney, pelvic, and lumbar fat (this includes the kidney knob, kidney, and surrounding fat), and the area of the rib eye muscle. The veterinary food inspection specialist can use the USDA standards or other publications listed in the inspection data packet to verify the grade of cutability.

(3) The carcass is weighed. The hindquarter accounts for about 48-50 percent of the weight of a side and contains the round, full loin, and flank. The forequarter comprises about 50-52 percent of the weight of a side and contains the primal rib, regular chuck, brisket, short plate, and foreshank.

(4) The legend for yield grade is placed on the forequarter and the hindquarter on all primal cuts, the same that is done with quality grading. See figure 2-2. A rolled grade is a USDA shield stamp that incorporates the quality grade and/or yield grade legends may be used.

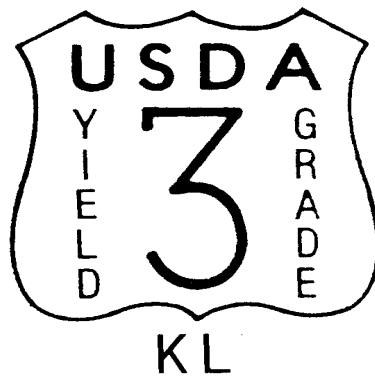


Figure 2-2. Yield grade.

Continue with Exercises

EXERCISES, LESSON 2

INSTRUCTIONS. The following exercises are to be answered by marking the lettered response that best answers the question, or by completing the incomplete statement, or by writing the answer in the space provided at the end of the question.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers.

1. _____ is beef just after slaughter that still retains most of its body heat.

2. Beef freezes at _____°F.

3. List the primal cuts of beef:
 - a. _____
 - b. _____
 - c. _____
 - d. _____
 - e. _____
 - f. _____
 - g. _____
 - h. _____
 - i. _____

4. When dividing a beef side the landmark is between the _____ and _____ ribs.

5. The process of dividing a side of beef into a forequarter and a hindquarter is known as _____ .

6. The term ribbing down is best described as:
- Dividing the forequarter into wholesale cuts
 - Dividing the hindquarter into wholesale cuts
 - Dividing the beef carcass into sides
 - Dividing the sides of beef into forequarters and hindquarters
7. The 13th beef rib is in the:
- Forequarter
 - Hindquarter
8. The muscle that is exposed is the _____ or back muscle when a side of beef is ribbed down.
9. Match the term in Column I to the definition in Column II.

COLUMN I

COLUMN II

- | | |
|--------------------------|---|
| (1) _____ Skirt | a. The internal surface of the abdominal cavity |
| (2) _____ Kidney knob | b. Attaches the gastrocnemius muscle to the bone. Used to hang the hindquarter from the meat rail |
| (3) _____ Flank pocket | c. The flat muscle that separates the thoracic cavity from the abdominal cavity |
| (4) _____ Jugular furrow | d. The kidney and surrounding fat |
| (5) _____ Gambrel cord | e. A groove between the neck muscles in which the esophagus, trachea, and blood vessels are found |
| (6) _____ Open beef side | f. The left side of the beef carcass; the kidney knob is attached loosely, leaving a space between it and the flesh beneath |

10. The tight side of beef refers to the:
- Closed beef side.
 - Open beef side.
11. The groove between the neck muscles in which the esophagus, trachea, and blood vessels were is called the _____ or _____.
12. In a forequarter of beef, the thin, pink to red muscle lying over the outside of the shoulder and ribs is the:
- Foreshank muscle.
 - Rib eye muscle.
 - Shoulder rose muscle.
 - False lean.
13. The bones in the foreshank are the _____ and _____.
14. The bones in the hindshank are the _____ and _____.
15. The gambrel cord is also called the _____.
16. Which of the following are NOT purchased by the military for carcass beef?
- Steers.
 - Heifers.
 - Cows.
 - Bulls.
 - Cows and bulls.

17. How many classes of beef are there?
- a. 4.
 - b. 5.
 - c. 6.
 - d. 7.
18. During a destination inspection, you find a carcass that shows a triangular gracilis muscle, knobby fat, and "bone to lean." What is the sex class of the animal?
- a. Heifer.
 - b. Cow.
 - c. Bull.
 - d. Steer.
19. A male bovine that has been castrated after reaching maturity is a steer.
- a. True.
 - b. False.
20. A female bovine that has yet to give birth is called _____.
21. Which of the following has the smaller neck?
- a. Stag.
 - b. Bull.
 - c. Steer.

22. Stag was the old term for which class?
- a. Cow.
 - b. Steer.
 - c. Bull.
 - d. Bullock.
23. Which of the following has a oval to kidney bean-shaped gracilis muscle?
- a. Cow.
 - b. Steer.
 - c. Heifer.
 - d. Bullock.
24. There are _____ constant factors for sex determination of carcass beef.
25. The constant factors are _____ , _____ , _____ , and _____.
26. Male bovines have _____ fat.
27. Female bovines have _____ fat.
28. Another term for dug fat is _____ fat.

29. Match the term in Column I to the definition in Column II.

COLUMN I

COLUMN II

- | | |
|---------------------------|---|
| (1) _____ Cod fat | a. A small area of exposed lean meat, 1 to 4 inches wide |
| (2) _____ Udder fat | b. Uneven and knobby fat |
| (3) _____ Bald spot | c. A smooth, thick covering of fat |
| (4) _____ Pizzle eye | d. Triangular or round in males; oval and kidney bean-shaped in females |
| (5) _____ Gracilis muscle | e. A round ball of clear, translucent material with some red fibers in the center |

30. Can an employee other than an USDA AMS MGCB employee apply an official grade mark to a carcass?

- a. Yes.
- b. No.

31. The US Standards for Grades of Beef Carcasses is used to _____ product.

32. The two factors to consider when determining the grade of beef are _____ and _____.

33. Of the two factors considered when determining grade _____ is more important.

34. Good quality beef has a fine _____ and a _____ feel when the fingertips are rubbed lightly over it.

35. Good quality beef is _____ to the touch and _____ red.

36. Which of the following areas will be utilized to make the final determination for quality grade?
- a. Rose of the shoulder.
 - b. Gracilis muscle.
 - c. Rib eye muscle.
 - d. Area of the flank.
37. The color of beef becomes _____ after chilling.
- a. Darker.
 - b. Lighter.
38. If beef feels sticky or gummy or retards the passage of a finger over a cut surface, it is:
- a. Coarse-textured.
 - b. Inferior quality beef.
 - c. Good quality beef.
 - d. Both "a" and "b" above.
39. The fat on grass-fed animals is:
- a. Soft, plastic, and yellow.
 - b. Firm, brittle, and creamy white.
40. The distribution of fat on a carcass is called the _____ .
41. On the external surface of a maturing bovine animal, the fat is first deposited on the _____ and _____ on each side of the back.

42. On the inner surface of a maturing bovine animal, the fat is first deposited around the _____ and in the _____ region.
43. Age is a quality factor and can be judged by looking at the _____ and the _____.
44. The _____ influences the rate of ossification of the bovine.
45. The official US Standards for Grades of Carcass Beef are listed in column II. List them in descending order in Column I.

COLUMN I

COLUMN II

(1) _____

a. Utility

(2) _____

b. Prime

(3) _____

c. Select

(4) _____

d. Standard

46. The military only procures _____ or _____ grades of beef.
47. Yield Grade 1 represents the highest degree of _____.
48. The lowest degree is Yield Grade _____.
49. If you received a carcass of Yield Grade 2 beef at destination and the contract called for Yield Grade 3 or better, would you reject the carcass?
- a. Yes
- b. No.

50. The yield grade is stamped only on the loin, round, chuck, and ribs.
- a. True.
 - b. False.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 2

1. hot carcass beef (para 2-1a)
2. 28 (para 2-1a)
3. square cut chuck
rib
short loin
sirloin
round
foreshank
brisket
plate
flank (para 2-1b)
4. 12th, 13th (para 2-1d)
5. ribbing down (para 2-1e)
6. d (para 2-1e)
7. b (para 2-1g)
8. eye of beef (para 2-1h)
9. (1) c (para 2-2d)
(2) d (para 2-2e)
(3) a (para 2-3a)
(4) e (para 2-2a)
(5) b (para 2-3b)
(6) f (para 2-1c)
10. a (para 2-1j)
11. jugular furrow, groove (para 2-2a)
12. c (para 2-2b)
13. radius, ulna (para 2-2b)
14. tibia, fibula (para 2-3b)
15. Achilles tendon (para 2-3b)

16. e (para 2-4)
17. b (para 2-4a)
18. d (para 2-4a(1))
19. a (para 2-4a(1))
20. heifer (para 2-4a(5))
21. c (para 2-4a(1))
22. d (para 2-4a(3))
23. c (para 2-4a(5), 2-4b(4))
24. four (para 2-4b)
25. pizzle eye (para 2-4b(1))
bald spot (para 2-4b(2))
cod fat or udder fat (para 2-4b(3))
shape of the gracilis muscle (para 2-4b(4))
26. cod (para 2-4b(3)(a))
27. udder (para 2-4b(3)(b))
28. udder (para 2-4b(3)(b))
29. (1) b (para 2-4b(3)(a))
(2) c (para 2-4b(3)(b))
(3) a (para 2-4b(2))
(4) e (para 2-4b(1))
(5) d (para 2-4b(4))
30. b (para 2-5)
31. grade (para 2-5a(1))
32. quality, age (para 2-5a)
33. quality (para 2-5a)
34. texture, velvety (para 2-5a(1)(a))

35. firm, cherry (para 2-5a(1)(a))
36. b (para 2-5a(1)(a))
37. b (para 2-5a(1)(a)1)
38. d (para 2-5a(1)(a)1)
39. a (para 2-5a(1)(a)2)
40. finish (para 2-5a(1)(a)2)
41. loin, ribs (para 2-5a(1)(a)2a)
42. kidneys, lumbar (para 2-5a(1)(a)2b)
43. chine bones, sacrum (para 2-5a(1)(b)1)
44. environment (para 2-5a(1)(b)2)
45. (1) b (para 2-5a(2))
(2) c (para 2-5a(2))
(3) d (para 2-5a(2))
(4) a (para 2-5a(2))
46. choice, select (para 2-5a(2))
47. cutability (para 2-5b(1))
48. 5 (para 2-5b(1))
49. b (para 2-5b(1))
50. b (para 2-5b(4))

End of Lesson 2

LESSON ASSIGNMENT

LESSON 3

Inspection of Carcass, Wholesale and Market-Ready Cuts of Beef.

LESSON ASSIGNMENT

Paragraphs 3-1 through 3-7.

LESSON OBJECTIVES

After completing this lesson you should be able to:

- 3-1. Identify inspection procedures for carcass beef.
- 3-2. Identify inspection procedures for wholesale cuts of beef.
- 3-3. Identify inspection procedures for market-ready beef.
- 3-4. Identify the basic inspection procedures for inspecting meat and / or meat products.

SUGGESTION

After studying the assignment, complete the exercises of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 3

INSPECTION OF CARCASS, WHOLESALE AND MARKET-READY CUTS OF BEEF

Section I. INSPECTION OF CARCASS BEEF

3-1. GENERAL

a. This section identifies the criteria used to determine compliance with the identity, condition, quality, and quantity requirements when inspecting carcass beef. The subject matter in this section will be presented from the viewpoint of the IMPS.

b. Sampling will be in accordance with the inspection data packet (IDP).

(1) If performing sampling inspection, inspect the same number of hindquarters and forequarters.

(2) If the trolley (the trolley is the hook-and-wheel apparatus on which the meat is hung) is weighed, it is part of the tare weight. The weight of the trolley used for forequarters is different from the weight of the trolley used for hindquarters.

c. An identification number will be stamped on each quarter (or a tag having a stenciled or printed number will be placed on each quarter) to identify each quarter with a specific carcass. For example, a number 20 will identify all quarters shipped from carcass 20.

3-2. IDENTITY/QUALITY INSPECTION

a. **Reference.** Use the reference that is specifically mentioned in the contractual documents to determine identity. Either the NAMP's, The Meat Buyer's Guide or the USDA's IMPS General Requirements, IMPS Quality Assurance Provisions and IMPS for Fresh Beef-Series 100. The reference not specifically identified in the inspection data packet can be used as a guide.

b. **Material Requirements.**

(1) Product must be in excellent condition.

(2) Exposed lean and fat surfaces shall be of a color and bloom normally associated with the class, grade, and cut of meat, and typical of meat which has been properly stored and handled. Cut surfaces and naturally exposed lean surfaces shall show no more than a slight darkening or discoloration due to dehydration, aging, and/or microbial activity.

(3) No odors foreign to fresh meat shall be present.

(4) The product should show no evidence of freezing, defrosting, or mishandling. Beef must be maintained in excellent condition through processing, storage, and transit.

(5) Dark cutting and/or calloused beef is not acceptable.

(6) All beef shall be practically free of bruises, blood clots, bloody tissue, blood discoloration, spinal cord portions, exposed blood vessels, cod, and/or udder fat, gambrel cord, or any other conditions that would negatively affect the use of the product.

(7) Beef cuts shall be free of dislocated or enlarged joints or other malformations of the skeletal structure.

(8) The cutting, trimming, and boning of the cuts shall be accomplished with sufficient care to allow each cut to retain its identity and to avoid objectionable scores in the lean meat. Ragged edges will be removed close to the lean surface, except for cuts that are separated through natural seams.

(9) All cut surfaces shall form approximate right angles with the skin surface.

(10) No more than a slight amount of lean, fat, or bone shall be removed or included from an adjacent cut.

c. **Identity of Product.** Identify the beef item as one of the following IMPS item numbers and compare to the requirements in the inspection data packet for identity, quality, and quantity (net weight or count). Institutional meat purchase specifications item numbers refer to the method by which a carcass is cut up, the following item descriptions are excerpts from the IMPS and are not always complete.

(1) Institutional Meat Purchase Specifications Item Number 100-Beef Carcass. The beef carcass shall consist of a forequarter and a hindquarter. The sides shall be produced by splitting the carcass down the back exposing the spinal groove at least 75 percent of the length of either side. No more than a minor amount of major muscles shall be removed from either side. The quarters are produced by splitting the carcass down the back either completely or partially separating the forequarters from the hindquarters by a cut following the natural curvature between the 12th and 13th ribs. The skirt (diaphragm) may be removed, but if not removed, the membranous portion will be trimmed close to the lean. The thymus gland and heart fat shall be closely removed.

(2) Institutional Meat Purchase Specifications Item Number 100A-Beef Carcass, Trimmed. This item is prepared as described in IMPS item number 100, except the kidney, kidney knob, adjacent internal fats, and hanging tender are removed. The fat covering the lumbar, sacral, pelvic, and tenderloin regions shall be trimmed not to exceed 1.0 inch (2.5 cm) in depth at any point.

(3) Institutional Meat Purchase Specifications Item Number 101-Beef Side. The side of beef is as described in IMPS item number 100 except the side consists of one matched forequarter and hindquarter. The side shall be trimmed as described in item number 100.

(4) Institutional Meat Purchase Specifications Item Number 102-Beef Forequarter. The forequarter is the entire anterior portion of the side after severance from the hindquarter as described in IMPS item number 100. The forequarter shall be trimmed as described in item number 100.

(5) Institutional Meat Purchase Specifications Item Number 155-Beef Hindquarter. The hindquarter is the entire posterior portion of the side after severance from the forequarter as described in IMPS item number 100.

d. **Determination of Sex Category.** The inspector identifies the sex of the carcass (Section II of Lesson 2) and determines if it complies with the sex requirement given in the inspection data packet. When the sex is not specified in the IDP, the beef may be from steers and/or heifers eligible for the US grade that is specified.

e. **Rolled Grade.** The rolled grade; quality and yield (Section II of Lesson 2) is located on the carcass and compared with the requirements in the inspection data packet. Receipt of a higher quality yield or quality grade designation is acceptable though it is different from the IDP requirement; a lower quality is unacceptable.

f. **Inspection Legend Approved Source Status.** All meat items procured in CONUS must originate from plants where the product is inspected for wholesomeness by the USDA. This is indicated by the USDA inspection legend. The legend will be placed directly on the carcass and on the marked end of the packing. The inspector verifies that the inspection legend is present (Section III of Lesson 1), and determines whether the carcass is from an approved source or if it is exempt from approved source listing.

g. **Weight Ranges.** There are four weight ranges listed in the IMPS. The ranges are a guideline, other weights are available, the customer should specify the weight desired. The military normally purchases ranges A, B, and C. The four ranges for carcass beef are as follows:

<u>Range A</u> <u>Pounds</u>	<u>Range B</u> <u>Pounds</u>	<u>Range C</u> <u>Pounds</u>	<u>Range D</u> <u>Pounds</u>
500-600	600-700	700-800	800-up

h. **Weight.** The weight of the carcass is usually stamped or written on a tag attached to the carcass. The veterinary food inspection specialist compares the weight range given in the inspection data packet to the actual weight of the carcass.

3-3. CONDITION INSPECTION-GENERAL

The Office of the Surgeon General has defined excellent condition as: meat that has a degree of freshness exhibited by meat maintained at an optimum temperature of 32°-40°F (0°-4.4°C) and normally, the product will not be more than ten days old from the date of slaughter. However, the final determination of excellent condition shall be based on product characteristics.

a. **Conveyance Inspection.** Inspect the conveyance to determine temperature, vehicle cleanliness, and presence of off-odors.

(1) Normally, carcass beef is hung while in transit.

(2) The inspection data packet should state shipping and delivery requirements. Temperature of conveyance, wrapping of carcasses while in transit are examples of delivery requirements.

(3) Examine the hooks. Pay special attention to the point of penetration. This cursory inspection is done to give the inspector a general idea of the cleanliness of the hooks and to ensure they are free of foreign matter.

b. **Evaluate Adequacy of Packaging, Packing and Marking.** The inspector determines if the packaging, packing, and marking of the carcass comply with the inspection data packet.

c. **Determine Age at Delivery.** The inspector determines the age of the carcass at delivery and if it meets the requirements listed in the inspection data packet.

d. **Determine Temperature.** The inspector determines the temperature of carcass beef and compares it with the requirements given in the inspection data packet. The temperature is taken in the thickest part of the carcass. On the forequarter, the temperature is taken in the rose of the shoulder. On the hindquarter, the temperature is taken in the thickest part of the round.

e. **Inspect for Abnormalities.** Examine the beef carcass for any abnormalities (Section II of Lesson 1). The veterinary food inspection specialist performs this inspection by visual, tactile, and olfactory examination. Some of the specific critical areas on the carcass to examine for off-condition are:

(1) Under the skirt. The anterior surface of the skirt lies in close contact with the thoracic wall. This impedes air circulation and promotes the retention or accumulation of moisture. In conjunction with muscle tissue, this moisture provides an excellent medium for the growth of bacteria. Place the hand under the skirt and examine the entire area for presence of slime or stickiness.

(2) Hanging tender. Because of its loosely connected muscle tissues and being located where it collects bloody drippings from the upper part of the railed carcass, it is susceptible to bacterial spoilage. Place the hand on the hanging tender and examine the entire surface for presence of slime or stickiness.

(3) Neck area or jugular furrow. The presence of blood and moisture resulting from the slaughtering and dressing operation offers an excellent medium for bacterial growth and spoilage. Examine for presence of slime or stickiness by rubbing the hand over the neck area.

(4) Exposed surface of lean tissue. In time, any exposed surface of lean tissue will become dark, slimy, sticky, and develop off-odor. This is particularly true of the exposed gracilis, brisket, neck, and rib eye muscles. Examine for presence of slime and stickiness by rubbing the hand over the exposed lean surfaces. Dark color is determined by visual examination.

(5) Ball-and-socket joint of the beef round. Due to slow chilling, the fluid in the ball-and-socket joint of the beef round will spoil rapidly. When this occurs, it is called a sour round. There is no external evidence of a beef round being sour. Examine by forcing a knife into the ball-and-socket joint of the round. Withdraw the knife and immediately smell the blade to determine off-odor.

Section II. INSPECTION OF WHOLESALE AND MARKET-READY CUTS OF BEEF

3-4. GENERAL

a. This section identifies the criteria used to determine compliance with the identity, condition, quality, and quantity requirements when inspecting wholesale or market-ready beef. The subject matter in this subcourse will be presented from the viewpoint of the IMPS. See figures 3-1 through 3-9 for illustrations.

b. To determine the lot size, the inspector must multiply the number of units per case by the total number of cases.

c. Sampling will be in accordance with (IAW) the inspection data packet.

(1) The sample unit will be one unit (or cut) of product, or the contents of one shipping container.

(2) If more than one style is present in the lot, samples should be taken proportionately from the various styles.

(3) Select sample units at random throughout the lot. For example, if units are packed five per case and your sample size is three, select one unit from each of three cases.

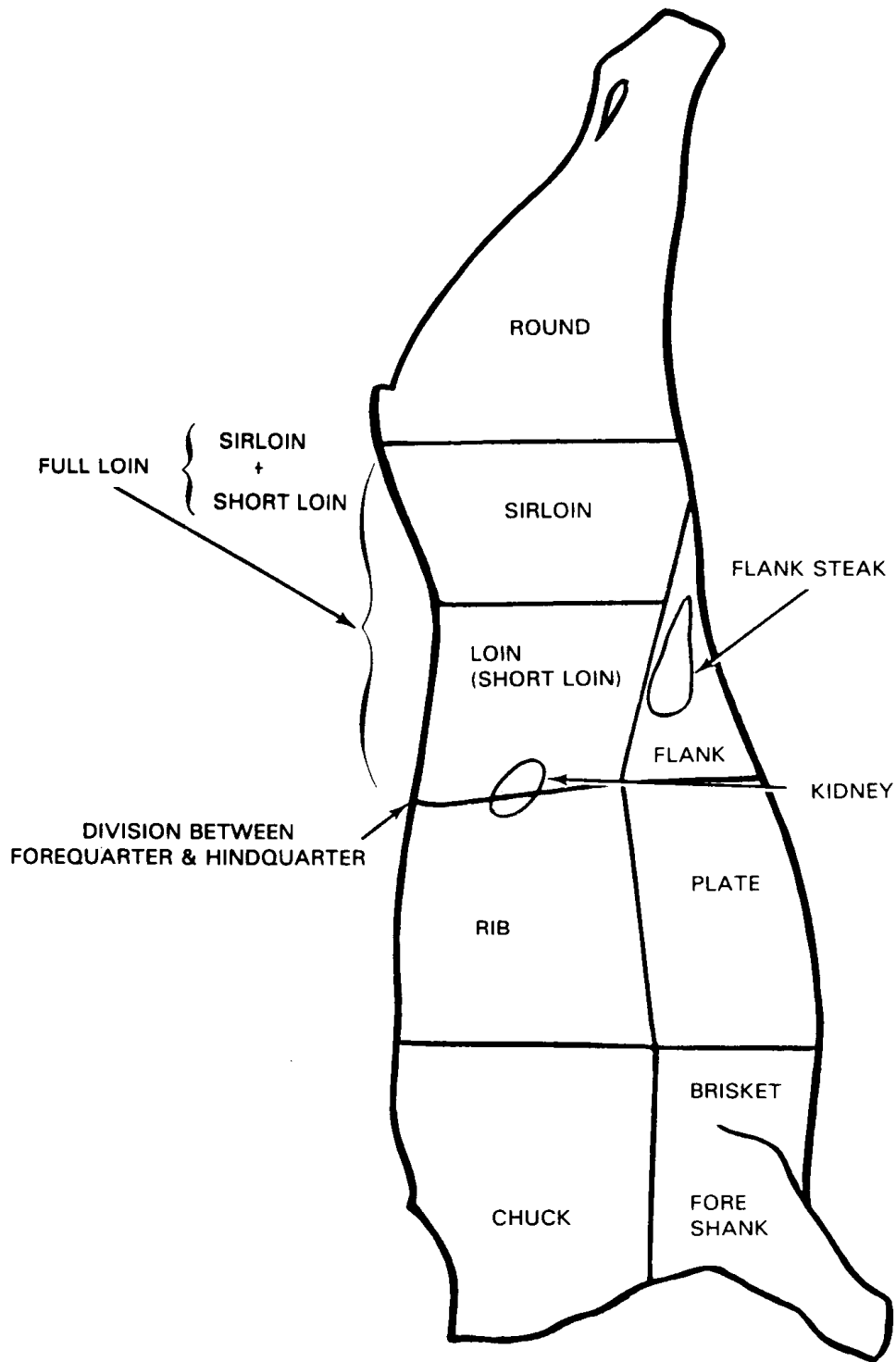
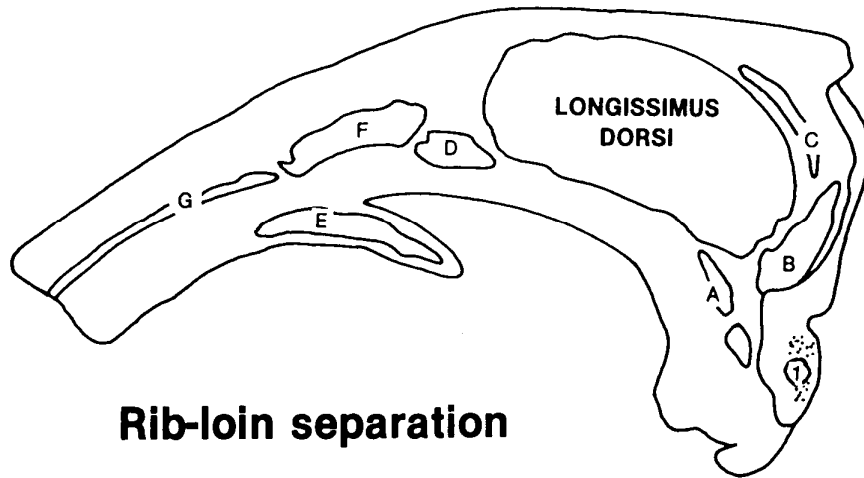


Figure 3-1. Standard wholesale cuts of beef.



Rib-loin separation

- | | | |
|-------------------------------|--------------------------------------|----------------------------|
| A Quadratus lumborum | E Diaphragm | ① Thoracic vertebra |
| B Multifidus dorsi | F Serratus dorsalis posterior | |
| C Spinalis dorsi | G Obliquus abdominis externus | |
| D Longissimus costarum | | |

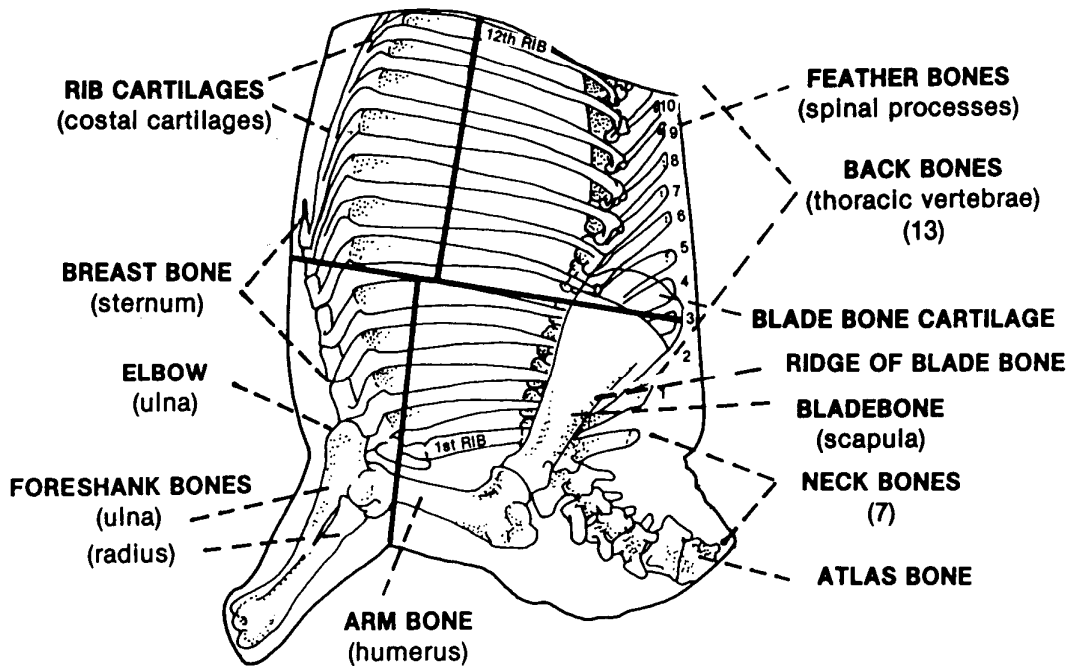
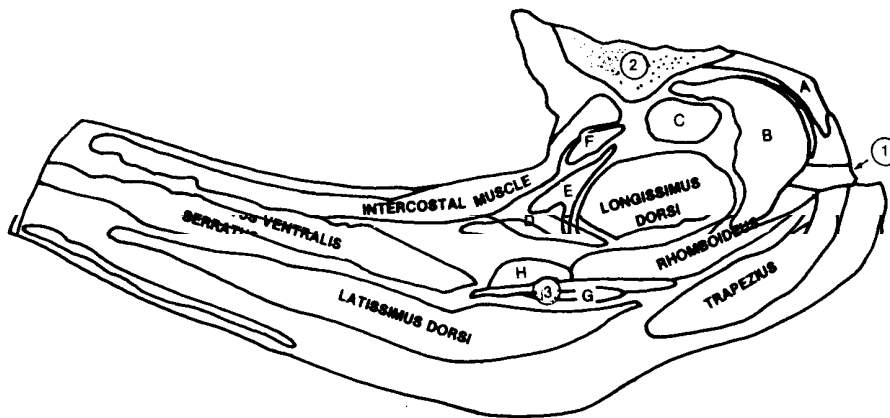


Figure 3-2. Separation of rib from loin, showing cut (above) and IMPS No. 102 (below)



Rib-chuck separation

- | | | |
|----------------------------|-------------------------------|----------------------------|
| A Multifidus dorsi | E Longissimus costarum | ① Ligamentum nuchae |
| B Spinalis dorsi | F Levatores costarum | ② Thoracic vertebra |
| C Complexus | G Infraspinatus | ③ Scapula |
| D Serratus dorsalis | H Subscapularis | |

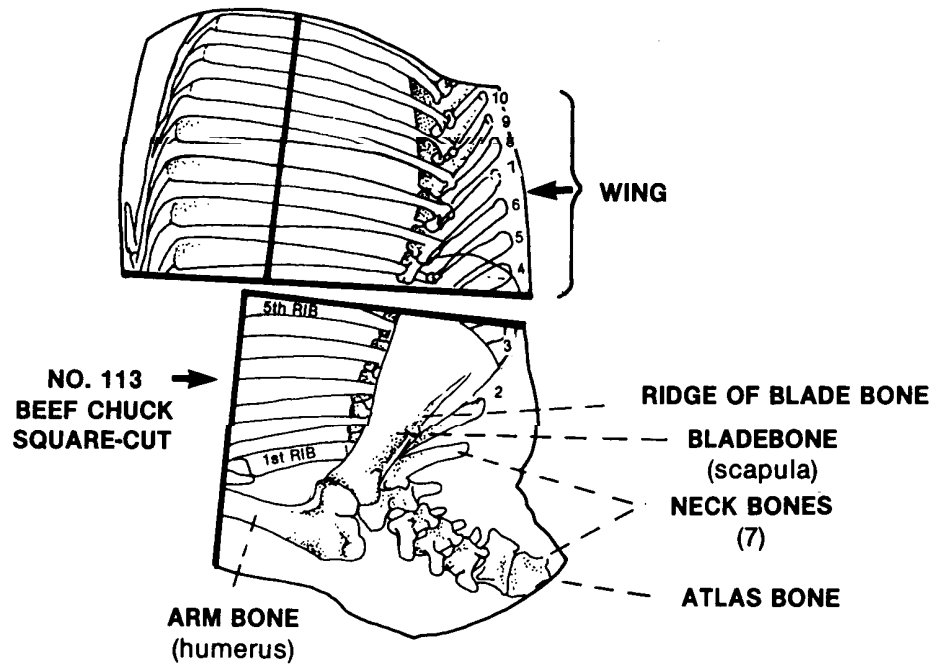


Figure 3-3. Separation of square-cut chuck from rib, showing cut (above) and IMPS No.113 (below).

Chuck-brisket separation

- A Brachiocephalicus
- B Superficial pectoral
- C Sterno-cleido mastoid
- D Triceps brachii, medial head
- E Tensor fasciae antibrachial
- F Cutaneous trunci
- G Intercostal muscles

- ① Humerus
- ② Ribs

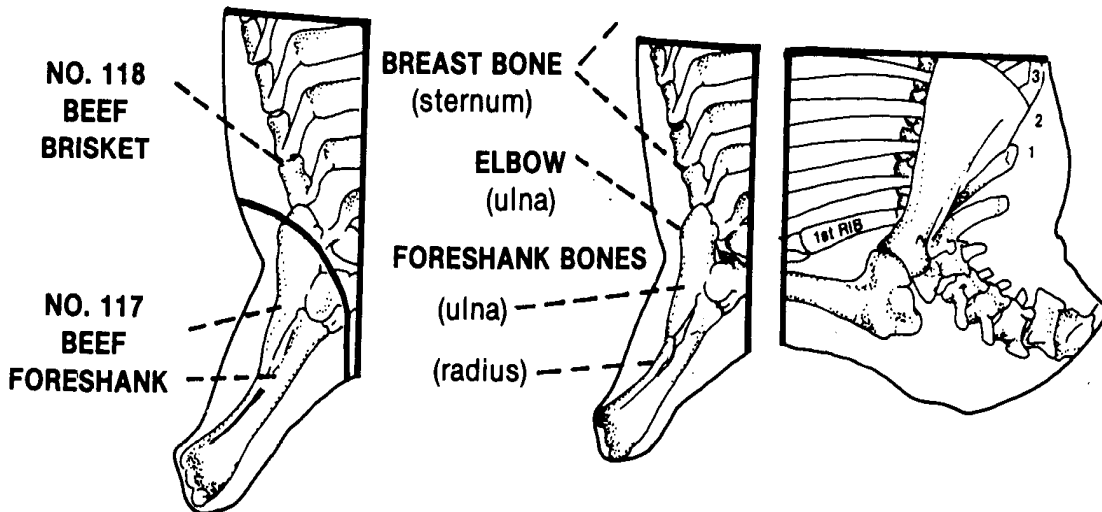
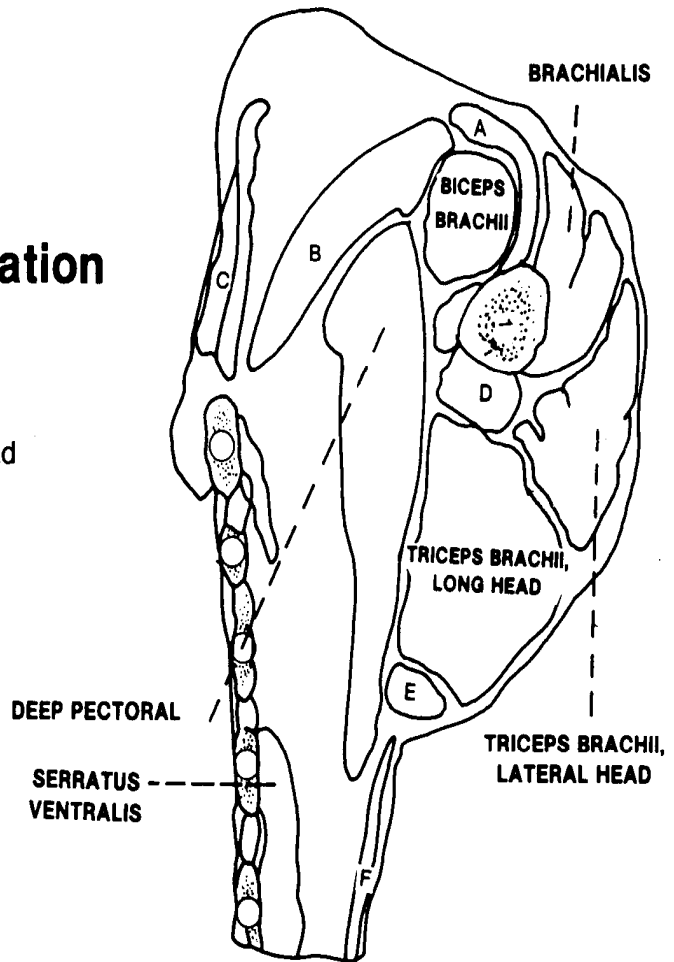
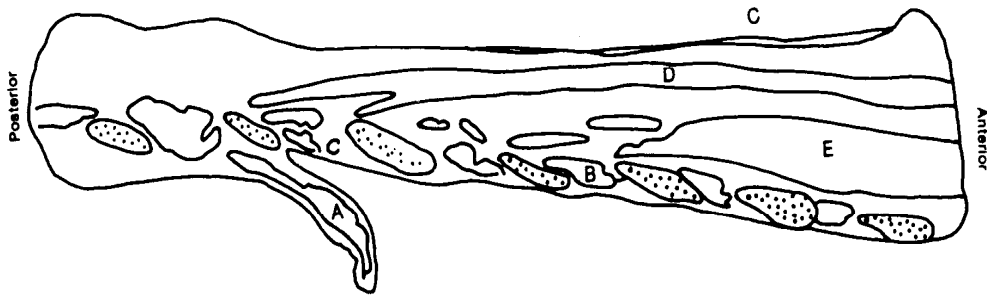


Figure 3-4. Separation of brisket from chuck, showing cut (above) and IMPS No. 117 and No. 118 (below).



Short plate-rib separation

- A Diaphragm
 - B Intercostal muscles
 - C Cutaneous trunci
 - D Latissimus dorsi
 - E Serratus ventralis
- 1 Ribs (6-12)

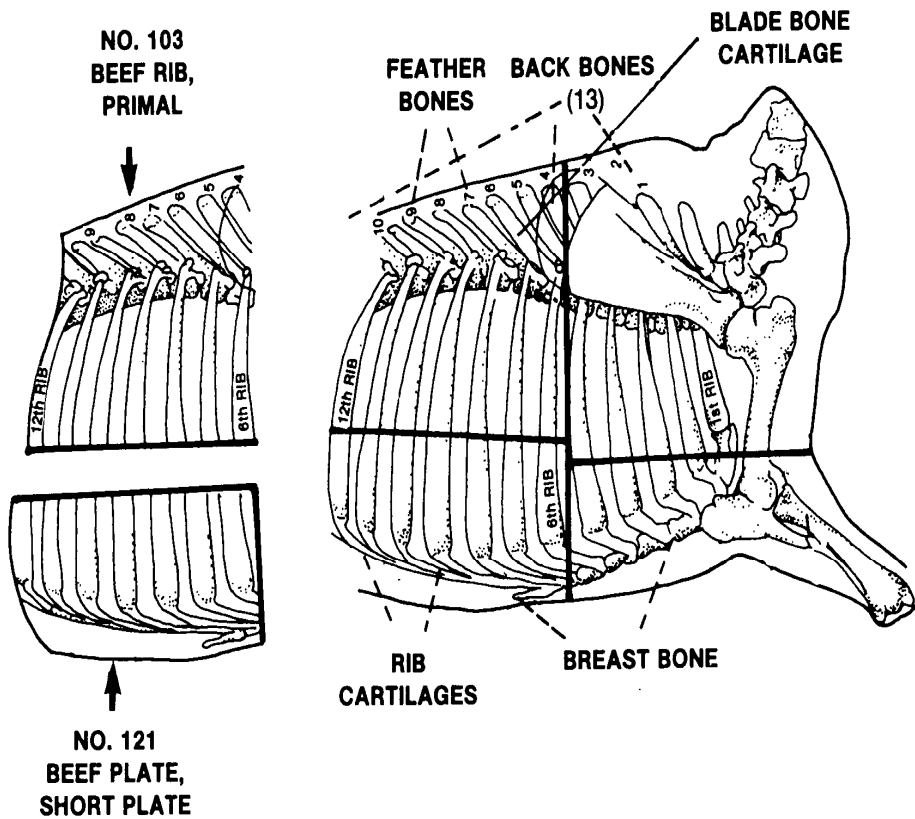
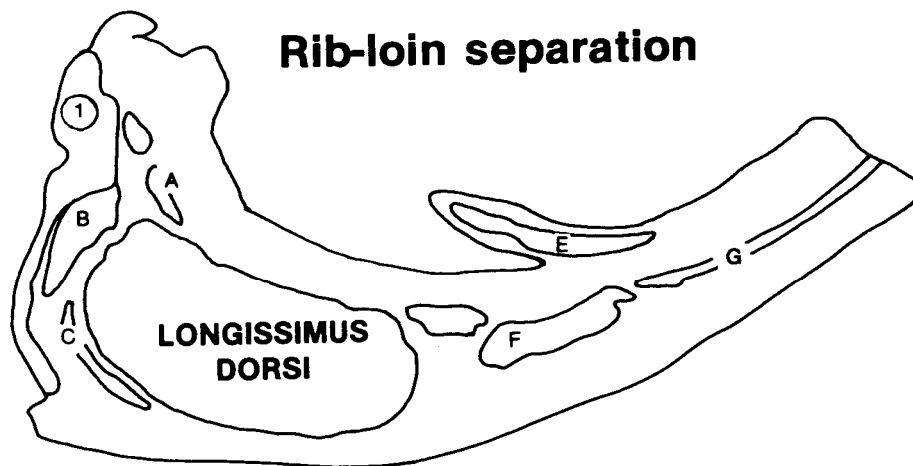


Figure 3-5. Separation of short plate from ribs, showing cut (above) and IMPS No. 103 and 121 (below).



- | | | |
|-------------------------------|--------------------------------------|----------------------------|
| A Quadratus lumborum | E Diaphragm | 1 Thoracic vertebra |
| B Multifidus dorsi | F Serratus dorsalis posterior | |
| C Spinalis dorsi | G Obliquus abdominis externus | |
| D Longissimus costarum | | |

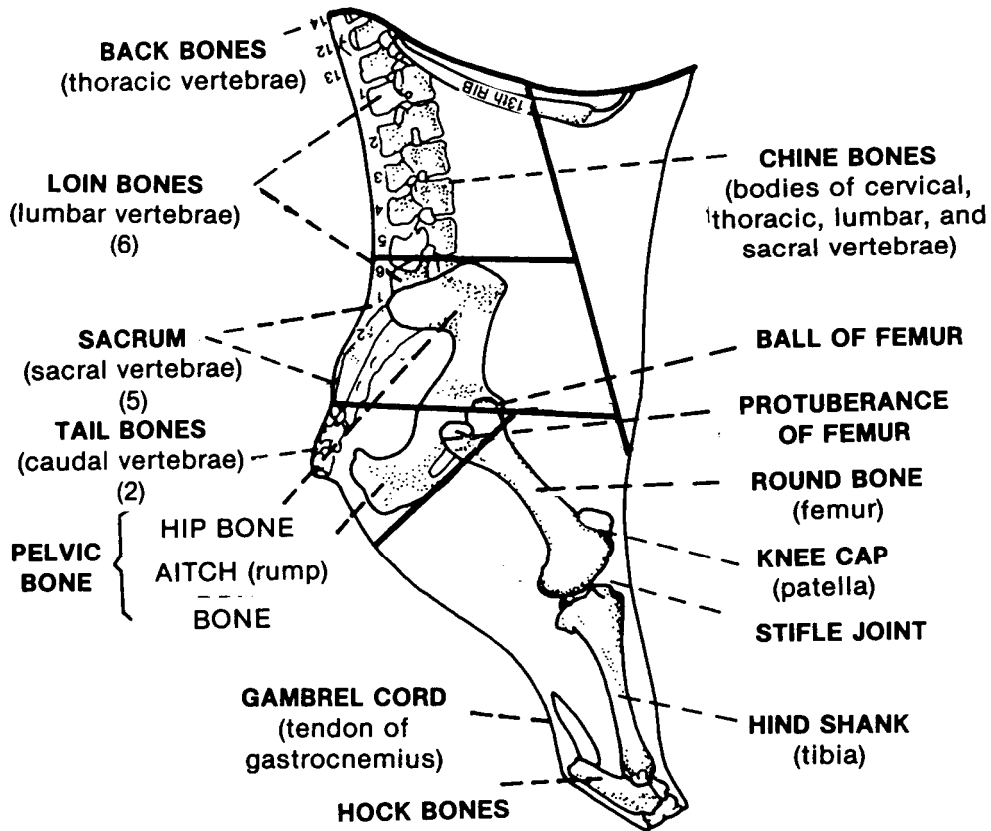


Figure 3-6. Separation of loin from ribs, showing cut (above) and IMPS No. 155 (below).

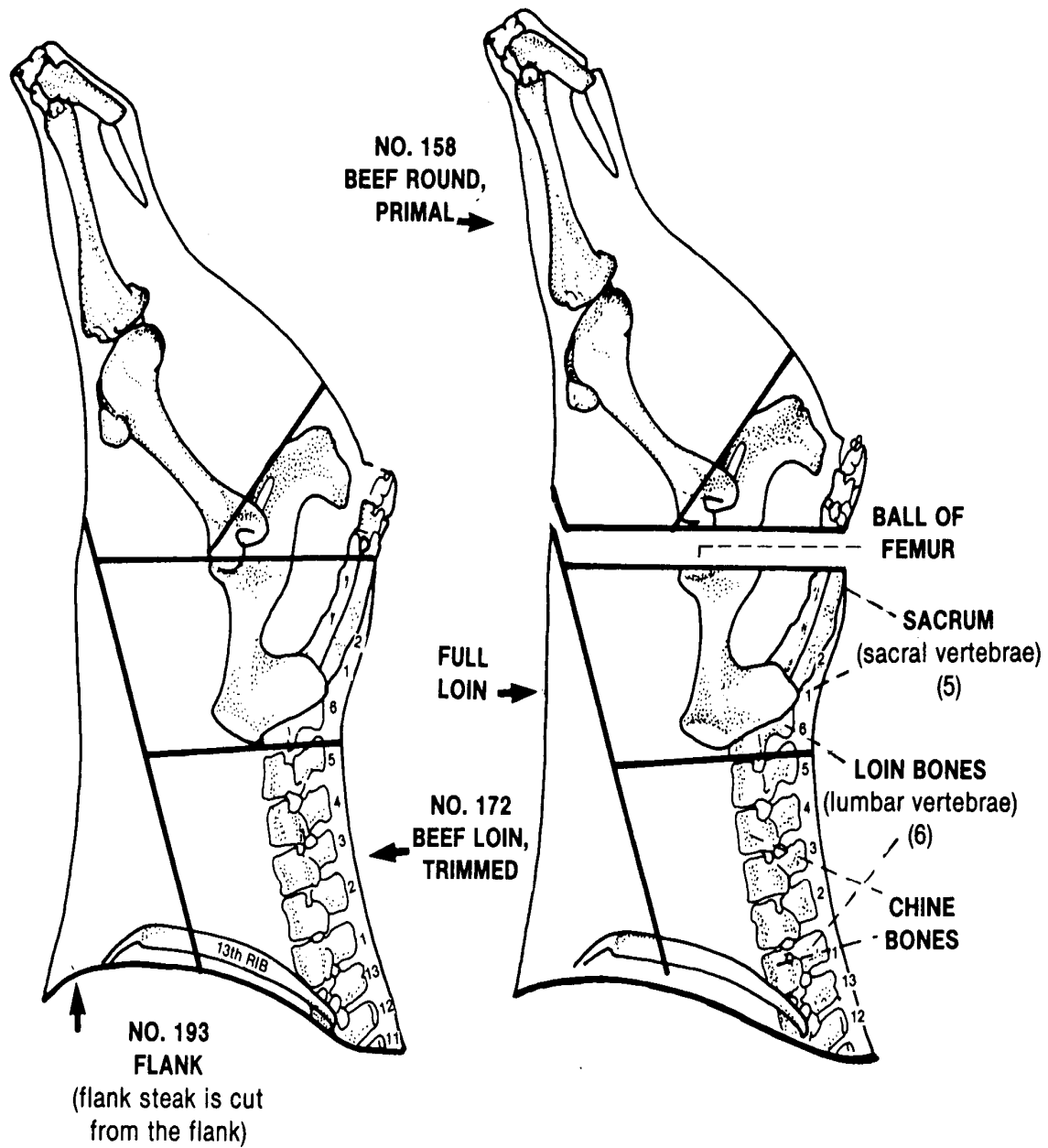


Figure 3-7. Separation of full loin from round, showing where the cut is made and IMPS No. 158, No. 172, and No. 193.

Loin-round separation

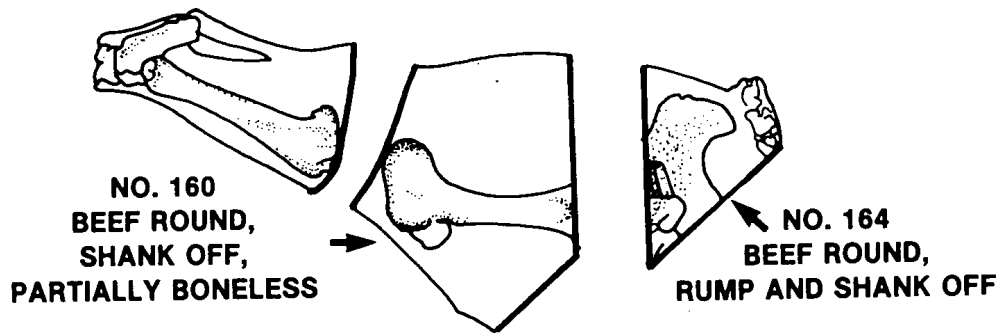
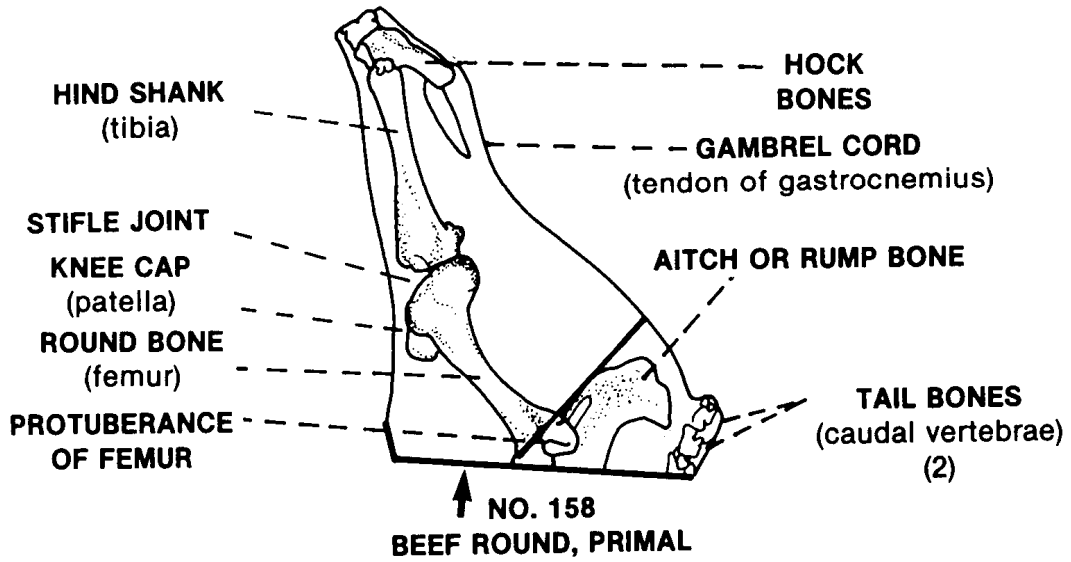
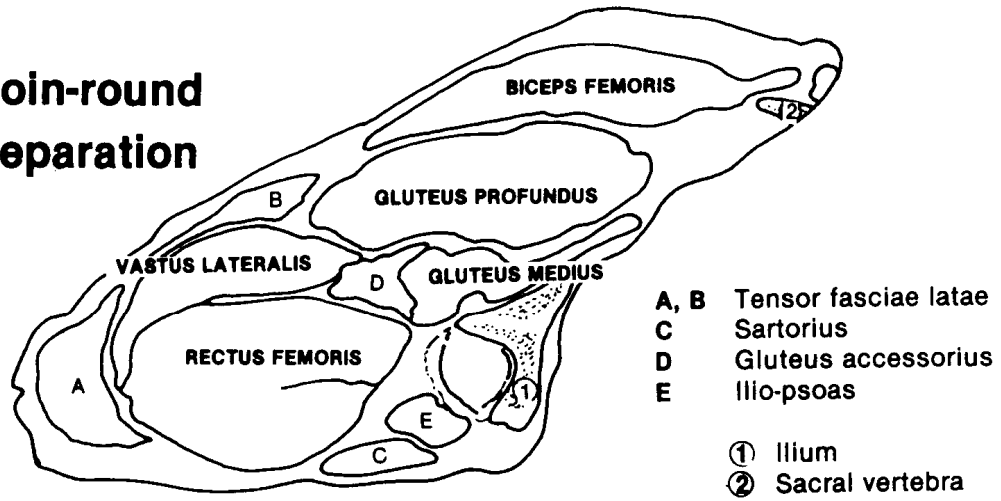
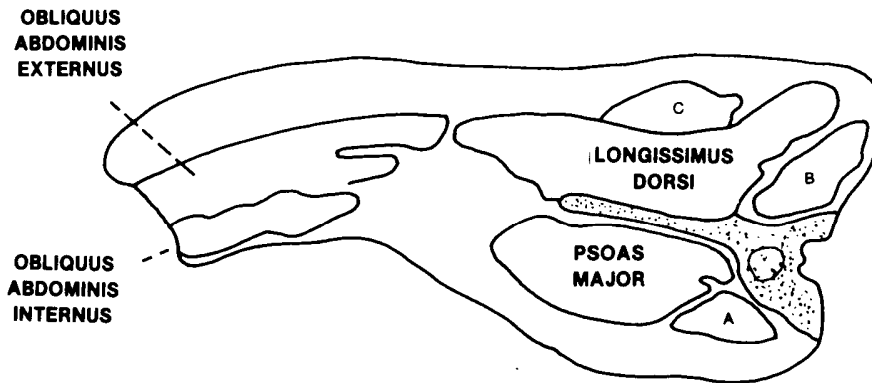


Figure 3-8. Separation of round from full loin, showing cut (above) and IMPS numbers 158, No. 160, and No. 164



Short loin-sirloin separation

- A Psoas minor
 - B Multifidus dorsi
 - C Gluteus medius
- ① Lumbar vertebra

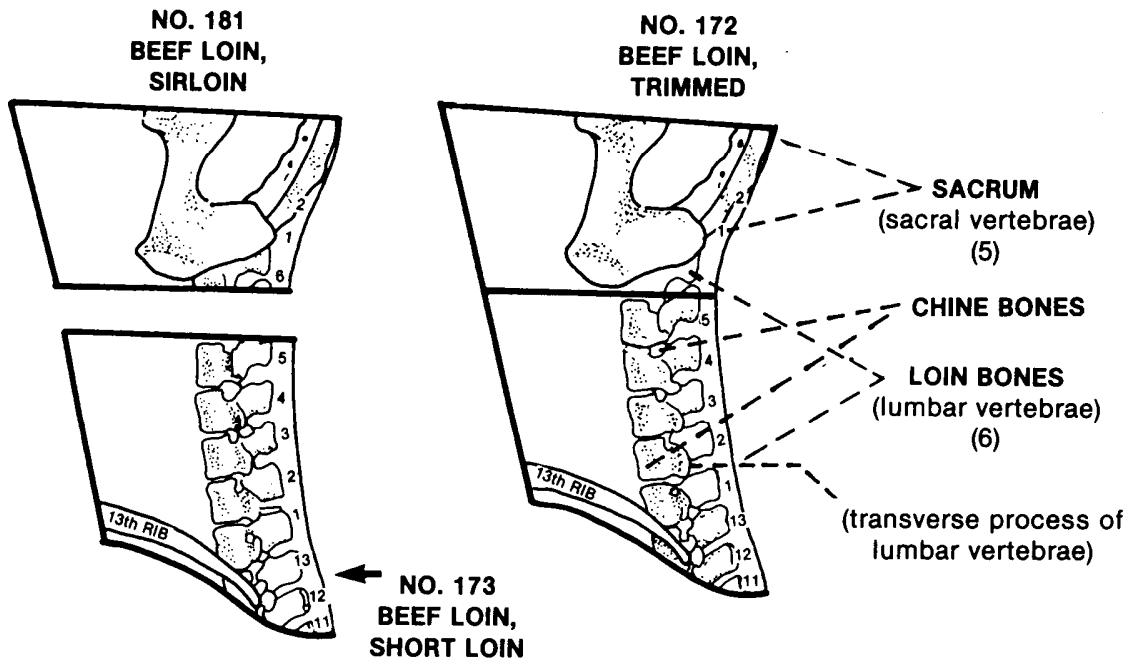


Figure 3-9. Separation of short loin from loin end (sirloin), showing cut (above) and IMPS No. 172, No. 173, and No. 181.

3-5. IDENTITY/QUALITY INSPECTION

a. **Reference.** Use the reference that is specifically mentioned in the contractual documents to determine identity. Either the National Association of Meat Prveyors (NAMP), The Meat Buyer's Guide or the USDA's IMPS General Requirements, IMPS Quality Assurance Provisions and IMPS for Fresh Beef-Series 100. The reference not specifically identified in the inspection data packet can be used as a guide.

b. **Identity of Product.** Identify the beef item as one of the following IMPS item number and compare to the requirements in the inspection data packet for identity, quality, and quantity (net weight or count). Institutional Meat Purchase Specifications Item Number item numbers refer to the method by which a carcass is cut-up, the following item descriptions are excerpts from the IMPS and are not complete. Figure 3-1 shows standard cuts of beef.

- (1) Cuts from the forequarter.

Institutional Meat Purchase Specifications Item Number Rib, Primal. The primal rib is that portion of the forequarter remaining after removal of the cross-cut chuck and short plate and shall contain seven ribs (6th to 12th inclusive), the posterior tip of the blade bone (scapula), and thoracic vertebrae attached to the ribs. The loin (posterior) end shall follow the natural curvature of the 12th rib. The chuck is removed by a straight cut between the 5th and 6th ribs. The short plate shall be removed by a straight cut which is ventral to, but not more than 6.0 inches (15.2 cm) from, the longissimus dorsi at the loin (posterior) end to a point on the chuck (anterior) end ventral to, but not more than 10.0 inches (25.4 cm) from, the longissimus dorsi. See figure 3-5.

(b) Institutional Meat Purchase Specifications Item Number 109-Beef Rib, Roast-Ready. This item is prepared as described in IMPS Item Number 103 except that the short plate shall be removed by a straight cut that is ventral to, but not more than 3.0 inches (7.5 cm) from, the longissimus dorsi at the loin end to a point on the chuck end ventral to, but not more than 4.0 inches (10.0 cm) from, the longissimus dorsi. The chine bone shall be removed such that the lean is exposed between the ribs and the feather bone / vertebrae junctures, leaving the featherbones attached. The blade bone and related cartilage, backstrap, latissimus dorsi, infraspinatus, subscapularis, rhomboideus, and trapezius shall be removed. The exterior fat covering (that covered the latissimus dorsi and trapezius) shall not exceed 1.0 inch (25 mm) in depth at any point. The fat cover may be separated to accommodate removal of the backstrap and returned to its original position. The fat cover shall be trimmed even with the short plate side and shall not have holes larger than 2.0 square inches (12.9 sq. cm). The rib shall be netted or tied when specified.

(c) Institutional Meat Purchase Specifications Item Number 109E-Beef Rib, Ribeye Roll, Lip-On, Bone In. This item is as described in Item 109D except that the short plate shall be removed by a straight cut which is ventral to, but not more than

2.0 inches (5.0 cm) from the longissimus dorsi. The purchaser specified options (PSO) for short plate removal are as follows:

- 1 PSO 1--1.0 in. (25 mm) x 1.0 in. (25 mm)
- 2 PSO 2--0 in. x 0 in. (product name shall omit reference to "lip on")
- 3 PSO 3--Other.

(d) Institutional Meat Purchase Specifications Item Number 113-Beef Chuck, Square-Cut. This item is the portion of the forequarter after removal of the rib, short plate, foreshank, and brisket. The rib end of the chuck shall be prepared by a straight cut between the 5th and 6th ribs. The brisket and foreshank shall be removed by a straight cut which is at an approximate right angle to the rib end. Evidence of the cartilaginous juncture of the 1st rib and the sternum shall be present on the brisket side.

(e) Institutional Meat Purchase Specifications Item Number 115-Beef Chuck, Square-Cut, Boneless. This boneless item is prepared from any chuck item with the brisket and foreshank removed. The full clod shall be separated (but included) as described in item number 114 and may be separated prior to cutting the brisket side. On the rib end, the longissimus dorsi shall be twice as large as the complexus. No fewer than 5 rib marks shall be present. The brisket side and rib end shall be straight cuts forming an approximate right angle. On the brisket side, the deep pectoral shall extend to the 3rd rib mark but not past the 5th rib mark. Unless otherwise specified, the blade portion shall be separated from the arm portion (after separation of the clod) by a straight cut, approximately perpendicular with the rib end, which is ventral to, but not more than 5.0 inches (12.5 cm) or less than 3.0 inches (7.5 cm) from, the longissimus dorsi at the rib end. All bones, cartilage, backstrap, prescapular lymph gland, heart fat and thymus gland shall be removed.

(f) Institutional Meat Purchase Specifications Item Number 116-Beef Chuck, Square-Cut, Clod-Out, Boneless. This item is prepared as described in IMPS Item Number 115 except that the shoulder clod shall be excluded.

(g) Institutional Meat Purchase Specifications Item Number 118-Beef Brisket. This item includes the anterior end of the sternum bones, the deep pectoral, and the (web) superficial pectoral muscle. The brisket is separated from the foreshank as specified in IMPS item number 117. The arm and the short plate sides shall be straight cuts that form an appropriate right angle. Evidence of the cartilaginous juncture of the 1st rib and the sternum and the cross section of 4 rib bones shall be present. See figure 3-4.

(h) Institutional Meat Purchase Specifications Item Number 120-Beef Brisket, Deckle Off, Boneless. This item is as described in IMPS item number 119 except that the deckle (hard fat and intercostal meat on the inside surface) shall be removed at the natural seam exposing the lean surface of the deep pectoral muscle.

The hard fat along the sternum edge shall be trimmed level with the boned surface. The inside lean surface shall be trimmed practically free of fat.

(i) Institutional Meat Purchase Specifications Item Number 123 - Beef Short Ribs. This item consists of the rib section from any rib and / or plate item and shall contain at least 2 but no more than 5 ribs (ribs 6 through 10). The dorsal side shall be at an approximate right angle to the rib bones and the latissimus dorsi shall be continuous across the cut surface. The ventral side shall be a straight cut that is approximately parallel to the dorsal side and does not contain any costal cartilage. The cutaneous trunci, diaphragm, and serous membrane (peritoneum) shall be removed. The surface fat shall be trimmed to not exceed 1/4 inch (6 mm) at any point. The purchaser shall specify the number of ribs and the width (distance between the dorsal and ventral sides) of the rib sections.

(j) Institutional Meat Purchase Specifications Item Number 123A-Beef Short Plate, Short Ribs, Trimmed. This item is as described in IMPS Item Number 123 except that it shall be derived from the 6th, 7th, and 8th ribs of the short plate, the serratus ventralis shall be continuous across the cut surface for at least 2 ribs on both the dorsal and ventral sides, and the exterior fat cover and the latissimus dorsi shall be removed.

(k) Institutional Meat Purchase Specifications Item Number 127-Beef Chuck, Cross-Cut. The chuck consists of the intact square-cut chuck, foreshank, and brisket and shall contain 5 ribs. The rib end of the chuck shall be a straight cut between the 5th and 6th ribs. The thymus gland and heart fat shall be closely removed. See figure 3-4

(2) Cuts from the Hindquarter.

(a) Institutional Meat Purchase Specifications Item Number 158-Beef Round, Primal. This item consists of the round (top and bottom round, portion of the knuckle, rump, heel, and shank). The loin end shall be exposed by a straight cut beginning at the juncture of the last sacral and the first caudal vertebrae, exposing the ball of the femur without severing the protuberance. No more than two vertebrae shall remain on the round. The obliquus abdominis internus (flank muscle) shall be removed. See figure 3-7.

(b) Institutional Meat Purchase Specifications Item Number 161-Beef Round, Shank Off, Boneless. This item is as prepared in IMPS Item Number 159 except that the shank is removed as described in Item number 160. Unless otherwise specified, the popliteal lymph gland shall be removed.

(c) Institutional Meat Purchase Specifications Item Number 161B-Beef Round, Heel and Shank Off, Without Knuckle, Boneless. This item is as described in item number 161 except that the heel and knuckle shall be removed by cutting through natural seams.

(d) Institutional Meat Purchase Specifications Item Number 167-Beef Round, Knuckle. This boneless item consists of the posterior portion of the full knuckle (vastus intermedius, vastus lateralis, vastus medialis, and rectus femoris) and the tensor fasciae latae. A portion of the sartorius may remain, if firmly attached. The loin end shall expose the tensor fasciae latae not completely extending around the outside of the knuckle. The knuckle is separated from the top (inside) round and bottom (gooseneck) round between the natural seams. All bones, and cartilages shall be removed. The tendinous end shall be removed exposing no less than 75 percent lean. When specified, the knuckle shall be split lengthwise into approximate equal portions.

(e) Institutional Meat Purchase Specifications Item Number 172-Beef Loin, Full Loin, Trimmed. This item is that portion of hindquarter remaining after removal of item number 158 and shall consist of the short loin, sirloin, and the 13th rib. The hanging tender, kidney and kidney knob and excess internal fat shall be removed. The round shall be removed by a straight cut anterior to the protuberance of femur. The rib (anterior) end shall follow the natural curvature of the 13th rib. The flank shall be removed by a straight cut ventral to, but not more than 6.0 inches (15.2 cm) from, the (posterior) end, which is ventral to, but not more than 1.0 inch (2.5 cm) from, the tensor fasciae latae. See figure 3-7.

(f) Institutional Meat Purchase Specifications Item Number 173-Beef Loin, Short Loin. This item consists of the anterior section of the loin and contains the 13th rib. The rib end shall follow the natural curvature of the 13th rib. The sirloin shall be removed by a straight cut anterior to the hip cartilage, forming an approximate right angle with the length of the short loin that exposes the gluteus medius. The flank shall be removed by a straight cut ventral to but not more than 6.0 inches (15.2 cm) from the longissimus dorsi at the rib end to a point on the sirloin end that is ventral to, but not more than 10 inches (25.4 cm) from, the longissimus dorsi. See figure 3-9.

(g) Institutional Meat Purchase Specifications Item Number Item No. 180-Beef Loin, Strip Loin Boneless. This item is boneless, consists of the anterior section of the loin, and contains the 13th rib mark. The hanging tender and tenderloin shall be removed. The rib end shall follow the natural curvature of the 13th rib mark. The sirloin end shall be anterior to the hip cartilage, forming an approximate right angle with the length of the short loin, and exposes the gluteus medius. The flank side shall be ventral to, but not more than 3.0 inches (7.5 cm) from the longissimus dorsi at the rib end to a point on the sirloin end ventral to, but not more than 2.0 inches (5.0 cm) from the longissimus dorsi.

(h) Institutional Meat Purchase Specifications Item Number 181-Beef Loin, Sirloin. This item is the posterior section of the full loin. The short loin shall be removed by a straight cut anterior to the hip cartilage and approximately parallel with the round end exposing the gluteus medius. The round shall be removed by a straight cut anterior to the ball and / or protuberance of femur. The flank shall be removed by a straight cut ventral to, but not more than 10.0 inches (25.4 cm) from, the longissimus

dorsi on the short loin end to a point on the round end ventral to, but not more than 1.0 inch (2.5 cm) from, the fasciae latae. See figure 3-9.

(i) I Institutional Meat Purchase Specifications Item Number 189-Beef Loin, Tenderloin, Full. This item is derived from a full intact loin and shall consist of the psoas major, psoas minor, iliacus, and may have presence of the sartorius. The obliquus abdominis internus (flap), if present, shall be trimmed level with the fat surface. The round end shall expose the psoas major, iliacus, and sartorius (when present). The surface fat shall be trimmed to not exceed 3/4 inch (19 mm) in depth at any point, from the posterior end to the exposed lymph gland and shall be tapered down to the lean at a point not beyond 3/4 of the length of the tenderloin. The tenderloin shall be trimmed free of ragged edges. All bones, and cartilages shall be removed. A score into the tenderloin exceeding 1/2 inch (13 mm) in depth is not acceptable.

c. **Rolled Grade.** The rolled grade; quality and yield, (Section II of Lesson 2) that is marked on each primal cut is located by the inspector and compared with the requirements in the inspection data packet. Receipt of a higher quality yield or quality grade designation is acceptable though it is different from the IDP requirement; a lower quality is unacceptable.

d. **Inspection Legend/Approved Source Status.** All meat items procured in CONUS must originate from plants where the product is inspected for wholesomeness by the USDA. This is indicated by the USDA inspection legend. The legend will be placed directly on the carcass and on the marked end of the packing. The inspector verifies that the inspection legend is present (Section III of Lesson 1), and determines whether the carcass is from an approved source or if it is exempt from approved source listing.

3-6. CONDITION INSPECTION

a. **Conveyance Inspection.** Inspect the conveyance to determine temperature, vehicle cleanliness, and presence of off-odors.

b. **Determine Adequacy of Packaging, Packing and Marking.** Determine if the packaging, packing, and marking of the product comply with the requirements in the inspection data packet. There should be no tears, rips, cuts, loss of vacuum, damage from crushing, nor damage from moisture or blood.

c. **Determine Age at Delivery.** The inspector determines the age of the product at delivery and the remaining shelf life and compares it to the requirements listed in the inspection data packet.

d. **Determine Temperature.** Determine the temperature and compare it with the requirements given in the inspection data packet. Chilled beef should be between 32°F (0°C) to 40°F (4.4°C) and frozen beef should be 0°F (-17.8°C) or below. The temperature is taken in the forequarter in the rose of the shoulder. In the hindquarter, it is taken in the thickest part of the round.

e. **Inspect for Abnormalities.** Examine the cuts of beef for any abnormalities (Section II of Lesson 1). The veterinary food inspection specialist does this inspection by visual, tactile, and olfactory examination.

Section III. INSPECTION PROCEDURES FOR MEAT AND/OR MEAT PRODUCTS

3-7. INSPECTION STEPS AND PROCEDURES

The veterinary food inspection specialist must have excellent personal hygiene, follow safe product handling practices, and equipment sanitation measures when handling food products. The following 10 steps list the required procedures used when performing a subsistence inspection for identity, condition, quality, and quantity.

a. **STEP 1.** Review previous inspection records, quality history records, and customer complaints if applicable to identify trends in nonconformance's. The veterinary food inspection specialist, using the inspection data packet, determines all contractual requirements such as: delivery requirements, temperature requirements, identity requirements, and packaging, packing, and marking requirements. Refer to the lesson in subcourse MD0705, Inspection Documents, on extracting information from a DLA/DSCP inspection data packet. Ensure the correct documents are selected and utilized in the inspection data packet and then review for requirements.

(1) For prime vendor deliveries, use the electronic catalogs located at www.dscp.dla.mil to find the product's characteristic requirements (that is, depending on the product description, a meat item may be inspected utilizing the IMPS, the NAMPS, or a contractor item description).

NOTE: In some instances, the inspector may use a standard or specification that is not contractually specified to evaluate an item. Guidelines for these procedures are contained in VETCOM Handbook 40-2.

(2) For Defense Commissary Agency (DeCA) deliveries, inspect in accordance with the VETCOM Handbook 40-5, Receipt Food Inspection Requirements Handbook. Requirements for these inspections will be in the resale ordering agreement (ROA), blanket purchase agreement (BPA), DSCP contract, or other purchasing tool.

(3) Requirements for deliveries to AAFES facilities will be in Exchange Services Regulation (ESR) 1-2.

(4) When contractual requirements cannot be obtained, notify your supervisor immediately and continue to inspect the product for characteristics associated with that product.

b. **STEP 2.** Inspect the conveyance or storage area, if necessary to determine temperature, cleanliness of vehicle or storage area and presence of off-odors. Detailed procedures for inspecting a conveyance or storage area can be found in subcourse MD0694, Basic Food Inspection Procedures and MD0717, Storage and Sanitation.

c. **STEP 3.** Select the samples in accordance with (IAW) the inspection data packet.

(1) The sample size for prime vendor inspections is IAW local SOP.

(2) The sample size for wholesale and retail activities (other than prime vendor) is IAW the VETCOM Handbook 40-5.

(3) Sample size for all surveillance inspections is IAW AR 40-656 or purchasing agency directives.

d. **STEP 4.** Determine the approved source status or exempt status of product. All meat items procured in CONUS must originate from plants where the product is inspected for wholesomeness by the USDA. This is indicated by the inspection legend placed directly on the carcass on each primal cut or on the marked end of the sealed container (packing). Also determine if the product complies with the Berry Amendment which requires all items be 100 percent grown and produced in the US, unless otherwise given special exempt status by the contract (this does not apply to commissaries, exchanges and non-appropriated fund instrumentalities).

(1) Beef and pork sources may be listed in the USDA Meat and Poultry Inspection Directory. This publication is available for order on the world wide web at: <http://www.fsis.usda.gov/OA/pubs/gpoorder.htm>.

(2) Other beef and pork sources may be listed in the USDA Foreign Countries and Plants Certified to Export Meat and Poultry to the US or VETCOM Circular 40-1.

(3) Any exceptions to (1) and (2) above will be outlined in the contractual documents.

e. **STEP 5.** Determine compliance with the requirement for correct packaging, packing, and marking. In some instances, meat items must be packaged in Cryovac plastic bags. The IMPS lists some packaging and packing options available to the purchaser, but other options are available. The purchaser is responsible to specify which IMPS option they desire or if there are any other specific requirements. The requirements should be stated in the contractual documents.

f. **STEP 6.** Determine compliance with the contractual requirements for age at delivery and remaining shelf life.

(1) The actual age at delivery (in days) is determined by subtracting the Julian date the product was manufactured from the Julian date the product was received.

(2) The actual remaining shelf life is determined by subtracting the Julian date at time of receipt from the Julian date of the product's expiration.

g. **STEP 7.** Determine compliance with the requirements for internal temperature. Detailed procedures for taking an internal temperature of a product can be found in subcourse MD0705, Temperature Determination.

h. **STEP 8.** Determine compliance with the requirements for gross product identity. For example, the military only procures two quality grades, prime and choice, ensure that this is what is delivered. The veterinary food inspection specialist must determine that the product received is the same as that specified in the inspection data packet and is also the same that was shipped. Compare the actual weight of the product to the weight requirement in the inspection data packet. The beef should show no evidence of excessive trimming in order to meet specified weight. Perform verification by checking inspection stamps, inspection reports, delivery vehicle numbers, invoices, manifests, labels, and the product.

NOTE: Identity is the product's characteristics with respect to type, style, class, grade, and size. Weight requirements may include net weight or weight range. Net weight is the weight of a product minus packaging and other material (tare weight). Weight range is an item's possible net weight that must be between minimum and maximum weight limits.

(1) Boxed beef procured by DeCA uses the requirements listed in the DeCA modified IMPS. Inspection for presence of correct muscles, borders, weight range, and trim requirements are all part of a complete identity inspection.

(2) For prime vendor inspections refer to Step 1 above for requirements, depending on the product description, a meat item may also be inspected using the IMPS, the NAMP Meat Buyer's Guide, or a contractor item description.

i. **STEP 9.** Inspect the product for obvious condition defects IAW the USDA IMPS General Requirements as defined by excellent condition. Condition is a product's state of fitness with regard to appearance, feel, smell, taste, freshness, and wholesomeness. The veterinary food inspection specialist must determine that the product is in the condition required by the inspection data packet. The packaging and packing is also examined to ensure that it will protect the product during storage and distribution.

(1) Normally, inspection for condition is performed while inspecting for identity requirements.

(2) An open package inspection (OPI) will be done on each sample unit.

(3) The veterinary food inspection specialist performs a visual, tactile, and olfactory inspection of the meat and/or meat products in order to determine any abnormalities.

(4) Frozen products must be thawed prior to conducting identity and condition examinations. Products may also require preparation (cooking) to determine condition.

j. **STEP 10.** Report inspection findings/Disposition of samples.

(1) Report discrepancies to your supervisor.

(2) Report inspection findings for DeCA facilities by entering the evaluation data in the Lotus Notes, DeCA Meat Inspection database, if necessary.

(3) Report inspection findings for prime vendor inspections by entering the evaluation data in the Lotus Notes, Prime Vendor Database. The database report must be finalized within 72 hours of the evaluation.

(4) Unless directed to report findings in (1) and (2) above report inspection findings on a DD Form 1232.

(5) Determine the disposition of the samples.

(a) Coordinate with the meat market manager or other accountable officer to ensure products that were used for open package inspection (OPI) are used before unopened product. Prior to return, store samples in a manner that prevents contamination and adulteration.

(b) Document the samples that were destroyed during examination or testing using the appropriate sample receipt.

1 Document samples taken at DeCA facilities using a DD Form 1222 sample receipt.

2 Document samples taken at other facilities using MEDCOM Form 57, Veterinary Service Food Sample Record.

Continue with Exercises

EXERCISES, LESSON 3

INSTRUCTIONS. The following exercises are to be answered by marking the lettered response that best answers the question, or by completing the incomplete statement, or by writing the answer in the space provided at the end of the question. After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers.

1. An identification _____ is stamped on each quarter, to identify each quarter with a specific carcass.
2. The IMPs for Fresh Beef is Series Number _____.
3. Cut surfaces shall form approximate _____ with the skin.
4. A carcass must conform to requirements. The _____ gland and fat shall be closely removed.
5. When splitting the beef carcass down the back, the _____ should be exposed _____ percent of the length of either side.
6. After trimming, fat in the pelvic region must not exceed _____ inch in depth at any point.
7. Does the hindquarter of beef (IMPS Item No. 155) contain the 12th and 13th rib?
 - a. Yes.
 - b. No.

8. In accordance with the Institutional Meat Purchase Specifications, IMPS Item No. 101 refers to the:
 - a. Side.
 - b. Forequarter.
 - c. Carcass.
 - d. Hindquarter.

9. The inspector locates the rolled grade and compares it with the _____ found in the inspection data packet (IDP).

10. Carcass beef maintained at ____°F to ____°F will normally exhibit excellent condition.

11. Normally, the product will not be more than ____ days old from the date of slaughter.

12. The critical areas of the carcass that require examination is under the _____, the neck area or _____ furrow the hanging _____, the ball-and-socket joint of the beef _____ and the exposed surface of _____ tissue.

13. Of the areas listed below, which are used to determine early off-condition of the forequarter?
 - a. Flank pocket, hanging tender, and skirt.
 - b. Flank pocket, gracilis muscle, and skirt.
 - c. Flank pocket, jugular furrow, and skirt.
 - d. Jugular furrow, skirt, and rib eye.

14. Weight Range C for a beef carcass as listed in the Institutional Meat Purchase Specifications is from _____ to _____ pounds.

15. The weight of a carcass is usually _____ or written on a _____ attached to the carcass.
16. Which of the following wholesale market cuts of beef are derived from the forequarter of beef? (More than one answer may be selected.)
- a. Beef Rib, Primal.
 - b. Flank.
 - c. Beef Foreshank.
 - d. Beef Plate, Short Plate.
 - e. Beef Loin, Short Loin.
17. There are _____ ribs required to be present in the Beef Short Plate, Short Ribs, Trimmed?
18. What is the name of the item that is the posterior section of the full loin?
- _____

19. Match the forequarter cut in Column II to the IMPS number in Column I.

COLUMN I

COLUMN II

- | | |
|----------------------|---------------------------------------|
| (1) ___ IMPS No. 103 | a. Beef Brisket |
| (2) ___ IMPS No. 109 | b. Beef Short Ribs |
| (3) ___ IMPS No. 113 | c. Beef Brisket, Deckle Off, Boneless |
| (4) ___ IMPS No. 115 | d. Beef Chuck, Square-Cut, Boneless |
| (5) ___ IMPS No. 118 | e. Beef Rib, Primal |
| (6) ___ IMPS No. 120 | f. Beef Rib, Roast Ready |
| (7) ___ IMPS No. 123 | g. Beef Chuck, Square-Cut |
| (8) ___ IMPS No. 127 | h. Beef Chuck, Cross-Cut |

20. Match the hindquarter cut in Column II to the IMPS number in Column I.

COLUMN I

COLUMN II

- | | |
|----------------------|------------------------------------|
| (1) ___ IMPS No. 158 | a. Beef Loin, Full Loin, Trimmed |
| (2) ___ IMPS No. 161 | b. Beef Loin, Short Loin |
| (3) ___ IMPS No. 167 | c. Beef Loin, Strip Loin, Boneless |
| (4) ___ IMPS No. 172 | d. Beef Loin, Sirloin |
| (5) ___ IMPS No. 173 | e. Beef Loin, Tenderloin, Full |
| (6) ___ IMPS No. 180 | f. Beef Round, Primal |
| (7) ___ IMPS No. 181 | g. Beef Round, Shank Off, Boneless |
| (8) ___ IMPS No. 189 | h. Beef Round, Knuckle |

21. Of the following cuts, which one does NOT come from the hindquarter of beef?

- a. Beef Round, Primal.
- b. Beef Loin, Sirloin.
- c. Beef Chuck, Square Cut.
- d. Beef Loin, Short Loin.

22. Which cut contains seven ribs (6th to 12th inclusive)?

- a. Beef Short Ribs.
- b. Beef Chuck, Square-Cut.
- c. Beef Rib Primal.
- d. Beef Brisket.
- e. Beef Foreshank.

23. Select the cut that includes the deep pectoral muscle, the superficial pectoral muscle, and the anterior end of the sternum bones.
- a. Beef Short Ribs.
 - b. Beef Chuck, Square-Cut.
 - c. Beef Rib Primal.
 - d. Beef Brisket.
 - e. Beef Foreshank.
24. Which cut has the surface fat trimmed to not exceed 1/4 inch at any point?
- a. Beef Short Ribs.
 - b. Beef Loin, Short Loin.
 - c. Beef Loin, Sirloin.
 - d. Beef Brisket, Deckle Off, Boneless.
 - e. Beef Loin, Tenderloin, Full.
25. Which cut is from the anterior section of the loin and contains the 13th rib mark?
- a. Beef Loin, Sirloin.
 - b. Beef Loin, Tenderloin, Full.
 - c. Beef Loin, Strip Loin, Boneless.
26. A score into the tenderloin is not acceptable if it exceeds _____ inch in depth.

27. Which of the following are separated from the Square-Cut Chuck?
- a. Flank.
 - b. Beef Foreshank.
 - c. Beef Brisket.
 - d. Beef Round, Shank Off.
 - e. Both "b" and "c" above.
28. Institutional Meat Purchase Specifications Item Number 172, Beef Loin, Full Loin, Trimmed, shall consist of the:
- a. _____
 - b. _____
 - c. _____
29. List the cuts that have a requirement to expose the gluteus medius muscle.
- a. _____
 - b. _____
 - c. _____
30. Which of the following wholesale market cuts of beef are derived from the hindquarter of beef? (More than one answer may be selected.)
- a. Beef Brisket.
 - b. Beef Loin, Short Loin.
 - c. Beef Chuck, Square-Cut.
 - d. Flank Steak.
 - e. Beef Loin, Sirloin.

31. Which cut includes the vastus intermedius, vastus lateralis, vastus medialis, and the rectus femoris muscles?
- a. Beef Round, Shank Off, Boneless.
 - b. Beef Loin, Full Loin, Trimmed.
 - c. Beef Loin, Strip Loin, Boneless.
 - d. Beef Round, Knuckle.
 - e. Beef Loin, Short Loin.
32. Select the IMPS item number that specifies that the chine bone be removed but that the featherbones remain attached.
- a. 109.
 - b. 112.
 - c. 113.
 - d. 120.
 - e. 123.
33. When the short plate is separated from the primal beef rib, what is the required distance from the longissimus dorsi muscle for the cut, at the posterior (loin) end?
_____ inches.
34. Select the IMPS item number that specifies that the ball of the femur must be exposed, without severing the protuberance.
- a. 167.
 - b. 172.
 - c. 173.
 - d. 158.
 - e. 160.

35. Select the muscle that is NOT exposed in the rib-loin separation.
- Longissimus dorsi.
 - Multifidus dorsi.
 - Serratus ventralis.
 - Obliquus abdominis externus.
 - Serratus dorsalis exterior.
36. Select the cut that exposes the following muscles: the rhomboideus, the trapezius, the longissimus dorsi, the spinalis dorsi, the latissimus dorsi, and the serratus ventralis.
- Chuck-brisket separation.
 - Rib-chuck separation.
 - Short plate-rib separation.
 - Rib-loin separation.
 - Loin-round separation.
37. Select the cut that exposes the following muscles: the biceps femoris, the gluteus medius, the gluteus profundus, the vastus lateralis, the rectus femoris, the tensor fasciae latae, the sartorius, and the iliopsoas.
- Chuck-brisket separation.
 - Rib-chuck separation.
 - Short plate-rib separation.
 - Rib-loin separation.
 - Loin-round separation.

38. What is the name of the item, which, on the round end, exposes the psoas major, iliacus, and sartorius muscles (when present)?

39. Select the IMPS item number that specifies a straight cut ventral to but not more than one inch from the tensor fasciae latae muscle on the round end.

a. 161.

b. 167.

c. 173.

d. 181.

e. 189.

40. The surface fat on the full tenderloin must be trimmed so that it does not exceed _____ inch in depth at any point.

41. Wholesale or market ready cuts of beef are examined for any abnormalities while performing the condition inspection. The veterinary food inspection specialist does this inspection by _____, _____, and _____ examination.

42. The rolled grade is marked on each _____.

43. When performing a conveyance inspection to determine temperature the inspector is also looking for _____ and _____.

44. When performing a subsistence inspection there are _____ steps that cover the required procedures.

45. Excessive trimming to meet the weight requirement is not acceptable.

a. True.

b. False.

46. When inspecting subsistence the veterinary food inspection specialist is looking at the _____, _____, _____, and _____ of the product.
47. Selection of samples is performed in step _____.
- a. 2.
 - b. 3.
 - c. 4.
 - d. 5.
48. Determining the disposition of samples is performed in step _____.
- a. 7.
 - b. 8.
 - c. 9.
 - d. 10.
49. The Receipt Food Inspection Requirements Handbook is used to perform which type of inspection?
- a. Prime vendor.
 - b. DeCA.
 - c. AAFES.
50. Inspection for quantity is performed in which step:
- a. 7.
 - b. 8.
 - c. 9.
 - d. 10.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 3

1. number (para 3-1c)
2. 100 (para 3-2a))
3. right angles (para 3-2b(9))
4. thymus, heart (para 3-2c(1))
5. spinal groove, 75 (para 3-2c(1))
6. 1 (para 3-2c(2))
7. b (para 3-2c(1))
8. a (para 3-2c(3))
9. requirements (para 3-2e)
10. 32, 40 (para 3-3)
11. ten (para 3-3)
12. skirt, jugular, hanging, round, lean (para 3-3e(1)-(5))
13. d (para 3-3e(1)-(5))
14. 700, 800 para 3-2g)
15. stamped, tag (para 3-2h)
16. a, c, d (figure 3-1)
17. 3 (para 3-5b(1)(j))
18. Sirloin (para 3-5b(2)(h))

19. (1) e (para 3-5b(1)(a))
(2) f (para 3-5b(1)(b))
(3) g (para 3-5b(1)(d))
(4) d (para 3-5b(1)(e))
(5) a (para 3-5b(1)(g))
(6) c (para 3-5b(1)(h))
(7) b (para 3-5b(1)(i))
(8) h (para 3-5b(1)(k))

20. (1) f (para 3-5b(2)(a))
(2) g (para 3-5b(2)(b))
(3) h (para 3-5b(2)(d))
(4) a (para 3-5b(2)(e))
(5) b (para 3-5b(2)(f))
(6) c (para 3-5b(2)(g))
(7) d (para 3-5b(2)(h))
(8) e (para 3-5b(2)(i))

21. c (para 3-5b(1)(d))

22. c (para 3-5b(1)(a))

23. d (para 3-5b(1)(g))

24. a (para 3-5b(1)(i))

25. c (para 3-5b(2)(g))

26. 1/2 (para 3-5b(2)(i))

27. e (figure 3-1)

28. Short loin
Sirloin
13th rib (para 3-5b(2)(e))

29. Short loin (para 3-5b(2)(f))
Sirloin (para 3-5b(2)(h))
Strip loin, boneless (para 3-6b(2)(g))

30. b, d, e (figure 3-1)

31. d (para 3-5b(2)(d))

32. b (para 3-5b(1)(b))

33. 6 (para 3-5b(1)(a))
34. d (para 3-5b(2)(a))
35. c (figure 3-6)
36. b (figure 3-3)
37. e (figure 3-8)
38. Beef loin, tenderloin, full (para 3-5b(2)(i))
39. d (para 3-5b(2)(h))
40. 3/4 (para 3-5b(2)(i))
41. visual, tactile, olfactory (para 3-6e)
42. primal cut (para 3-5c)
43. vehicle cleanliness, off odors (para 3-6a)
44. 10 (para 3-7)
45. a (para 3-7h)
46. identity, condition, quality, quantity (para 3-7)
47. b (para 3-7c)
48. d (para 3-7j)
49. b (para 3-7a(2))
50. b (para 3-7h)

End of Lesson 3

LESSON ASSIGNMENT

LESSON 4

Inspection of Beef Roasts and Steaks.

LESSON ASSIGNMENT

Paragraphs 4-1 through 4-5.

LESSON OBJECTIVES

After completing this lesson you should be able to:

- 4-1. Identify terms used in the production of beef roasts and steaks.
- 4-2. Identify inspection procedures for beef roasts and steaks.
- 4-3. Determine the fat content of ground beef.

SUGGESTION

After studying the assignment, complete the exercises of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 4

INSPECTION OF BEEF ROASTS AND STEAKS

Section I. GENERAL

4-1. TERMS USED IN THE PRODUCTION OF BEEF ROASTS AND STEAKS

a. **Butterflying.** The practice of cutting steak slices thicker than required, then cutting that slice practically in two, and then folding it out to form one thinner slice (a practice used to make steaks from the thin end of a tenderloin). Butterflying a portion of meat to meet weight and thickness requirements is not acceptable.

b. **Shoulder Rose.** A thin subcutaneous muscle located on the lateral surface of the shoulder clod roast (cutaneous omobrachialis), normally less than 1/8 inch in thickness and approximately 10 to 12 square inches in area.

c. **Seam.** An area of attachment of two adjacent muscles.

d. **Surface Fat.** Fat on the outer surface of a cut of meat.

e. **Seam Fat.** Fat between two layers of muscle tissue.

f. **Netting.** Inserting a boneless cut of meat in an elastic netting material so that the cut may retain its shape and hold together during cooking.

g. **Knitting.** Placing two or more small pieces of meat together and then passing them through a tenderizing machine several times so that they hold together and make one larger steak.

h. **Cubing.** Passing a slice of meat through a tenderizing machine two or three times, thus breaking down the tough connective tissue.

i. **Rib Eye.** That portion of the longissimus dorsi contained in the rib primal.

j. **Chuck Eye.** That portion of the longissimus dorsi contained in the square-cut chuck.

k. **Loin Eye.** That portion of the longissimus dorsi contained in the short loin.

l. **A.** Abbreviation for anterior.

m. **Di.** Abbreviation for distal.

- n. **Do.** Abbreviation for dorsal.
- o. **Po.** Abbreviation for posterior.
- p. **Px.** Abbreviation for proximal.
- q. **V.** Abbreviation for ventral.
- r. **Long Axis.** The length of a cut of meat, normally anterior-to-posterior or distal-to-proximal.
- s. **Grain of the Meat.** Longitudinal direction of the muscle fibers (similar to the grain of wood). When steaks are cut, they shall be sliced perpendicular to the grain of the meat to achieve tenderness.
- t. **Tempering (Tempered).** The controlled defrosting of a frozen item until its internal temperature rises to approximately 26°F (-3.34 °C).
- u. **Pressing (Pressed).** Placing a tempered cut of meat into a mold and reshaping it under 500-750 pounds-per-square-inch (psi) pressure until a desired shape is achieved.
- v. **Refreezing (Refrozen).** Placing a tempered pressed cut of meat in a freezer to reduce its internal temperature to 0°F (-17.8°C) or lower.

Section II INSPECTION OF BEEF ROASTS AND STEAKS

4-2. GENERAL

- a. Beef roasts and steaks are portion-controlled items that have been made boneless and processed to specific requirements so that they may be cooked and served in a dining facility without further processing (boning, trimming, slicing, and so forth).
- b. Prior lessons pertaining to beef, taught identification of cuts utilizing skeletal structures. Now, identification must be determined using muscle groups. It may be necessary to review Lessons 1 and 2 for terms and Lesson 3 for wholesale market cuts of beef.
- c. Sampling will be in accordance with the inspection data packet.

4-3. IDENTITY/QUALITY INSPECTION

a. **Reference.** Use the reference that is specifically mentioned in the contractual documents to determine identity. Either the NAMP's, The Meat Buyer's Guide or the USDA's IMPS General Requirements, IMPS Quality Assurance Provisions and IMPS for Fresh Beef-Series 100. The reference not specifically identified in the inspection data packet can be used as a guide.

b. **Material Requirements.** Beef roasts and steaks may be produced from wholesale cuts, boneless wholesale cuts, or carcass beef. The beef shall be in excellent condition, have good color normal to the grade, be practically free of bruises, blood clots, bone dust, ragged edges, and discoloration, and show no evidence of defrosting and refreezing. Boning shall be accomplished with sufficient care to allow each cut to retain its identity and to avoid objectionable scores. Steaks shall be cut at approximately right angles to the grain and butterflying is prohibited.

c. **Identity of Product.** Identify the beef IMPS item number and compare to the requirements listed in the inspection data packet (IDP) for identity, quality, and quantity (net weight and count). The beef should show no evidence of excessive trimming in order to meet specified weight. Follow the steps and procedures listed in Section III of Lesson 3. The following item descriptions are excerpts from the IMPS and are not complete. Refer to figure 4-1 for location of cuts.

(1) Institutional Meat Purchase Specifications Item Number 112-Beef Rib, Ribeye Roll. The ribeye roll includes the longissimus dorsi, spinalis dorsi, complexus, and multifidus dorsi muscles as described in IMPS item number 108 (see figure 3-6). The "lip" (serratus dorsalis and longissimus costarum muscles and related intermuscular fat) on the short plate side shall be removed at the natural seam immediately ventral to the longissimus dorsi. This item shall be practically free of surface fat and intercostal meat. All other muscles, bones, cartilages, backstrap, and the exterior fat cover shall be removed.

(2) Institutional Meat Purchase Specifications Item Number 112A--Beef Rib, Ribeye Roll, Lip-On. This item is the same as IMPS item number 112 except that the "lip" (serratus dorsalis and longissimus costarum muscles and related intermuscular fat) remains attached on the short plate side and shall be prepared by a straight cut which is ventral to, but not more than 2.0 inches (5.0 cm) from, the longissimus dorsi.

(3) Institutional Meat Purchase Specifications Item Number 114B-Beef Chuck, Shoulder Clod Roast, Special. This item is as described in IMPS item number 114A except that the whole clod shall be split lengthwise, the ends shall be reversed so that the boned surfaces are placed together to produce a uniformly thick roast. Netting or tying shall hold the roasts together. When smaller roasts are specified, the roast shall be divided by a straight cut(s) at a right angle to the length of the clod into approximate equal portions.

(4) Institutional Meat Purchase Specifications Item Number 116A--Beef Chuck, Chuck Roll. This boneless item consists of the large muscle system of the chuck that lies under the blade bone and contains the longissimus dorsi, rhomboideus, spinalis dorsi, complexus, mustifidus dorsi, serratus ventralis, subscapularis, and splenius. The rib end shall be made by a straight cut exposing the longissimus dorsi to be at least twice as large as the complexus and forms an approximate right angle with the dorsal side. The neck shall be removed by a straight cut which is approximately parallel with the rib end and is anterior to, but not more than 1/2 inch (13 mm) from, the serratus ventralis. The arm portion shall be removed by a straight cut that is at an approximate right angle to the rib end and is, not more than 3.0 inches (7.5 cm), ventral from the longissimus dorsi at the rib end and not more than 4.0 inches (10.0 cm) from the complexus at the neck end. All bones, cartilage, backstrap, trapezius, supraspinatus, intercostal meat (rib fingers), and prescapular lymph gland shall be removed. When smaller roasts are specified, the chuck roll shall be divided by cutting through the meat perpendicular to the length of the chuck roll into approximately equal portions. This item shall be netted or tied when specified. The purchaser-specified options (PSO) are as follows:

(a) Purchaser-specified options--1--Arm removed by a straight cut not exceeding 1.0 inch (25 mm) from the longissimus dorsi on the rib end and 1.0 inch (25 mm) from the complexus on the neck end.

(b) Purchaser-specified options--2--Arm removed by straight cut immediately ventral to longissimus dorsi and complexus

(c) Purchaser-specified options--3--The subscapularis shall be removed

(d) Purchaser-specified options--4--The "hump meat" (dorsal portion of the rhomboideus) shall be removed so that the dorsal edge is a straight cut parallel to the arm (ventral) edge

(5) Institutional Meat Purchase Specifications Item Number 167A--Beef Round, Knuckle, Peeled. This boneless item is as described in IMPS item number 167 except that the tensor fasciae latae muscle, fat, and "skin" tissue are removed. When smaller roasts are specified, the knuckle shall be split lengthwise into approximate equal portions.

(6) Institutional Meat Purchase Specifications Item Number 171C--Beef Round, Eye of Round. This boneless item consists of the semitendinosus and shall not be severed on either end. The eye is separated from the top and outside rounds and heel between the natural seams.

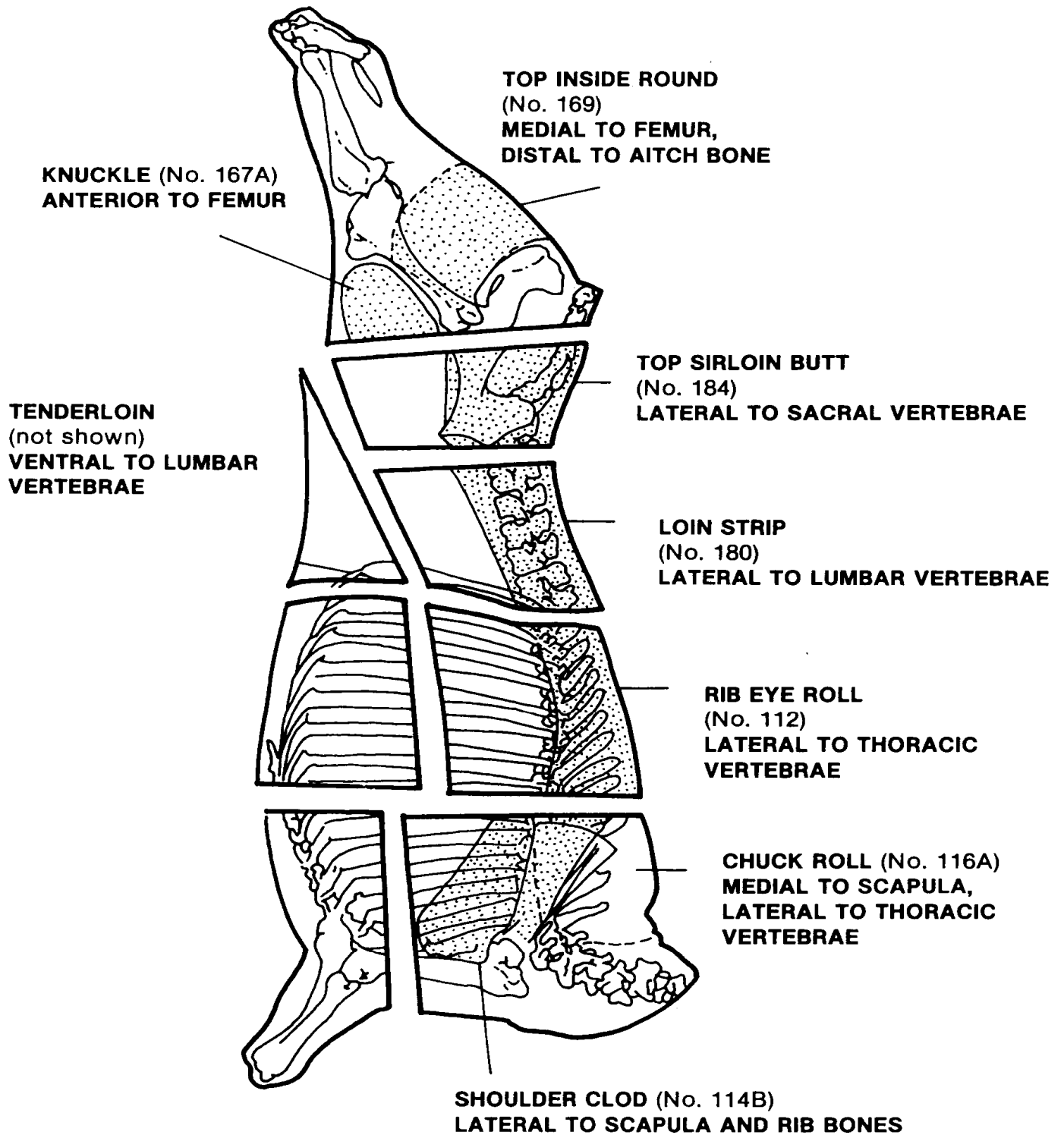


Figure 4-1. Location of roasts and steaks.

(7) Institutional Meat Purchase Specifications Item Number 184--Beef Loin, Top Sirloin Butt, Boneless. This item is prepared from IMPS item number 182 and contains the gluteus medius, gluteus accessorius, gluteus profundus, and the biceps femoris (see figure 4-1). The short loin end shall be approximately parallel to the round end exposing the gluteus medius. On the round end, the biceps femoris shall be approximately equal to or larger than the gluteus medius. The bottom sirloin shall be removed by a straight cut along the natural seam and continues to the outside surface leaving a portion of the tensor fasciae latae attached to the top sirloin butt. All bones, cartilages, tenderloin, and the sacrosciatic ligament, and the lean and fat, which overlies the ligament, shall be removed.

(8) Institutional Meat Purchase Specifications Item Number 189A--Beef Loin, Tenderloin, Full, Side Muscle On, Defatted. This item is as described in IMPS item number 189 except that it shall be practically free of surface and wing fat (fat lying between the main body of the tenderloin and the iliacus (wing) muscle).

(9) Institutional Meat Purchase Specifications Item Number 191--Beef Loin, Tenderloin, Butt. This item shall consist of the sirloin portion of the psoas major, psoas minor, iliacus, and may have presence of the sartorius and the obliquus abdominis internus, if present, it shall be trimmed level with the fat surface. The round end shall expose the psoas major, iliacus, and sartorius. The anterior end shall be exposed by a straight cut that exposes the psoas major and the psoas minor and no more than 1/2 inch (1.3 cm) anterior to the iliacus. The surface fat shall be trimmed not to exceed 3/4 inch (1.9 cm) in depth at any point. The large lymph gland shall be exposed. All bones, cartilages, and the quadratus lumborum shall be removed. A score into the tenderloin exceeding 1/2 inch (1.3 cm) is not acceptable.

(10) Institutional Meat Purchase Specifications Item Number 193--Flank, Flank Steak. This item consists of the rectus abdominis from the flank region and is separated from the transversus abdominis, obliquus abdominis internus, and obliquus abdominis externus through the natural seams. This item shall be practically free of fat and the membranous tissue.

(11) Institutional Meat Purchase Specifications Item Number 1112--Beef Rib, Ribeye Roll Steak. Ribeye roll steaks shall be prepared from any IMPS ribeye roll item. The lip shall be removed exposing the natural seam immediately ventral to the longissimus dorsi.

(12) Institutional Meat Purchase Specifications Item Number 1180A--Beef Loin, Strip Loin Steak, Boneless, Center-Cut. The steaks shall be prepared from any boneless strip loin item that has the posterior portion of the strip loin removed at or anterior to the gluteus medius. The gluteus medius, if present, may appear only on one side.

(13) Institutional Meat Purchase Specifications Item Number 1184A--Beef Loin, Top Sirloin Butt Steak, Semi Center-Cut, Boneless. The steaks shall be as

described in IMPS item number 1184 except that all muscles other than the longissimus dorsi, gluteus medius, and the biceps femoris shall be removed. The longissimus dorsi may or may not be present.

(14) Institutional Meat Purchase Specifications Item Number 1189--Beef Loin, Tenderloin Steak. The steaks shall be prepared from any IMPS tenderloin item. However, the narrowest diameter of the cut surface of the psoas major must be at least 1.0 inch (2.5 cm) (excluding fat). Any fat or lean not firmly attached to the psoas major shall be removed.

d. **Inspection Legend/Approved Source Status.** All meat items procured in CONUS must originate from plants where the product is inspected for wholesomeness by the USDA. This is indicated by the USDA inspection legend. The legend will be placed directly on the carcass and on the marked end of the packing. The inspector verifies that the inspection legend is present (Section III of Lesson 1), and determines whether the carcass is from an approved source or if it is exempt from approved source listing.

4-4. CONDITION INSPECTION

a. **Conveyance Inspection.** Inspect the conveyance to determine temperature, vehicle cleanliness, and presence of off-odors.

b. **Determine Adequacy of Packaging, Packing and Marking.** Determine if the packaging, packing, and marking of the pork comply with the requirements in the inspection data packet. There should be no tears, rips, cuts, loss of vacuum, damage from crushing, nor damage from moisture or blood.

c. **Determine Age at Delivery.** The inspector determines the age of the product at delivery and the remaining shelf life and compares it to the requirements listed in the inspection data packet.

d. **Determine Temperature.** Determine the product temperature and compare it with the requirements given in the inspection data packet.

e. **Inspect for Abnormalities.** Examine the beef roasts and steaks for any abnormalities. Discoloration is any color variation other than normal. However, it is not unusual for vacuum-packaged, boneless cuts (or formed steaks and roasts produced from vacuum-packaged, boneless cuts) or cuts from fresh, bone-in beef carcasses to display a greenish, or in some cases, a brownish color. This caused by oxidation in and around seam areas and on the surfaces of the product. Discoloration alone, as described here, would not convey a spoilage condition. This assumes that the raw material used to produce the item is in excellent condition, that the integrity of the product was not compromised, and that the product was processed in accordance with the applicable requirements of the specification. Other abnormalities that may be found can be located in Section II of Lesson 1.

Section III. DETERMINING FAT CONTENT OF GROUND BEEF

4-5. DETERMINING FAT CONTENT (HOBART TESTING)

a. Fat content determination may be required for trimmings. The method of determining fat content of raw meat products is called the thermal extraction method. This method utilizes the Fat Percentage Indicator for Ground Beef, Model F-100, or F-101, manufactured by the Hobart Manufacturing Company, Troy, Ohio, or its equal. See figure 4-2.

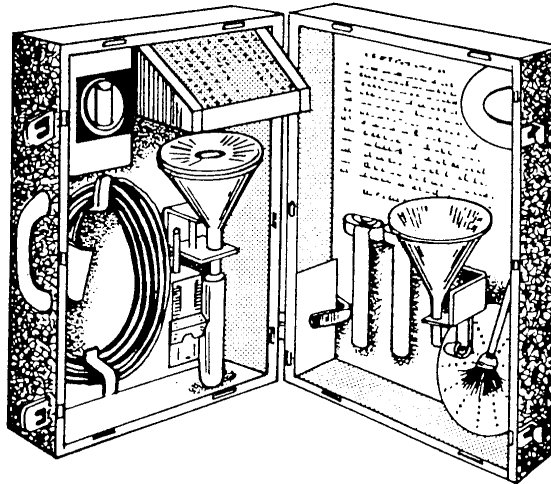


Figure 4-2. Fat percentage indicator.

b. Fat content of ground beef is determined by using the following procedure.

(1) Calibrate the fat percentage indicator.

(a) Heating element. Check the temperature of the heating element twice a week. A minimum temperature of 380°F (193.3°C) should be attained. Heating elements showing temperatures of less than 380°F (193.3°C) should be subjected to additional tests prior to replacement.

(b) The power line monitor. The Power Line Monitor, RCA Model WV, 120 A (AC), 100-140 volts, will be used to monitor the voltage during the entire period of use of the Hobart Fat Percentage Indicator. No tests will be performed at a voltage of less than 110 volts.

(c) The time indicator. Periodically, check time indicator with watch. The time indicator is set for a time span of 15 minutes, plus or minus 1 minute. When the time indicator is inaccurate by 2 minutes or more, replace the time indicator.

(d) The standard for the examination. A satisfactory Hobart examination will be achieved provided that the voltage is not less than 110 volts, that the heating element glows with a cherry red color, and that the meat sample has a charred appearance at the end of the 15-minute test period.

(2) Prepare machine for use.

(a) Standard instrument to be used. Only test tubes manufactured by the Hobart Manufacturing Company will be used. The inside diameter of the test tube is calibrated along with the graduated scale to attain the accurate percentage of fat.

(b) Proper positioning. After the glass funnel and test tube are placed in their proper position, the machine is plugged in.

(c) Preheating, if necessary. When operating Hobart equipment in cold rooms or coolers below 65°F (18.3°C), preheat unit for 2 minutes prior to testing the first sample unit only. In addition, close unit to maintain heat.

(3) Prepare sample.

(a) A sample of trimmings will be ground.

(b) The sample size is one container.

(c) The sample is ground through a constant-speed grinder (electric) equipped with a plate having holes 3/4 inch in diameter. The second grind is through a plate having holes 1/8 inch in diameter.

(d) All sample units should not be less than 34°F nor more than 55°F when tested.

(4) Extract sample. Two ounces of ground meat are removed from the sample.

(a) This sample must be weighed on a gram scale in order to assure that the sample is 2 oz. (56.7 grams). The sample will be weighed to the nearest 0.1 gram.

(b) Check accuracy of scale with weight set balance prior to weighing the first sample unit and again at intervals of each six-sample unit.

(c) Before and after weighing each sample unit, the balance pan of the scale will be thoroughly cleaned with a damp cloth or absorbent paper.

(5) Prepare final sample. The 2 ounces of ground beef is formed into the shape of a doughnut.

(a) The sample will have an outer diameter of approximately 3 inches and a 1-inch diameter hole in the center.

(b) There will be a diagram of the desired sample configuration on the inside of the Hobart Testing Kit.

(c) The sample should be handled as little as possible.

(d) Sample weight should be rechecked after final preparation.

(6) Process sample. There may be instructions on the Fat Percentage Indicator listing the procedures for determining fat.

(a) Place sample patty weighing 56.7 grams gently on disc plate; make sure the sample patty does not plug the holes in the disc, so drippings can drop into the test tube. No portion of the sample should extend outward beyond the edge of the disc.

(b) Place sample disc on the top of the funnel directly below heating unit.

(c) After placement of sample on funnel, turn heating element knob to the 15-minute setting.

(d) At the end of 15 minutes, a bell will ring and the results will be read.

(7) Read results. The pointers to indicate fat percentage are adjusted and fat percentage read to the nearest whole percent. See figure 4-3.

(a) To determine percent of fat, position the hairline pointer of the measuring device in line with the bottom of the meniscus (concave portion) of the yellow fluid.

(b) The bottom pointer of the measuring device must be placed exactly on the line separating the fat from the cooked juices in the test tube.

(c) Read fat to the nearest whole percent.

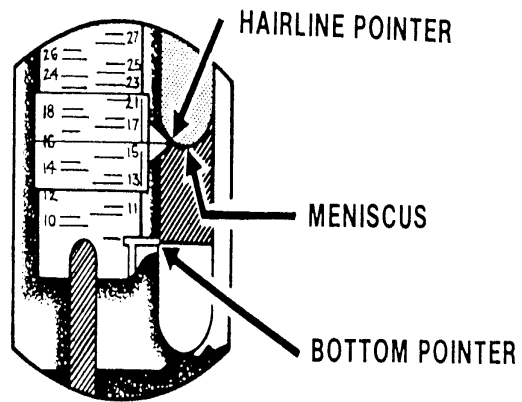


Figure 4-3. Measuring device of fat percentage indicator.

Continue with Exercises

EXERCISES, LESSON 4

INSTRUCTIONS. The following exercises are to be answered by marking the lettered response that best answers the question or by completing the incomplete statement or by writing the answer in the space provided at the end of the question. After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers.

1. The fat between two layers of muscle tissue is _____ fat.
2. The fat on the outer surface of a cut of meat is _____ fat.
3. The _____ _____ is that portion of the longissimus dorsi muscle contained in the rib primal.
4. The _____ _____ is that portion of the longissimus dorsi muscle contained in the square-cut chuck.
5. The _____ _____ is that portion of the longissimus dorsi muscle contained in the short loin.
6. The _____ _____ _____ _____ is the longitudinal direction of the muscle fibers.
7. Write the correct abbreviation.
 - a. _____ Abbreviation for anterior
 - b. _____ Abbreviation for distal
 - c. _____ Abbreviation for dorsal
 - d. _____ Abbreviation for posterior
 - e. _____ Abbreviation for proximal
 - f. _____ Abbreviation for ventral

8. Match the term in Column I to the definition in Column II.

COLUMN I

COLUMN II

- | | | |
|-----------|--------------|---|
| (1) _____ | Netting | a. The controlled defrosting of a frozen item until its internal temperature rises to approximately 26°F. |
| (2) _____ | Knitting | |
| (3) _____ | Cubing | b. The placing of a tempered cut of meat into a mold and reshaping it under 500-700 pound-per-square-inch (PSI) pressure until the desired shape is achieved. |
| (4) _____ | Butterflying | |
| (5) _____ | Tempering | c. The placing of a tempered and pressed cut of meat into a freezer to reduce its internal temperature to 0°F or lower. |
| (6) _____ | Pressing | |
| (7) _____ | Refreezing | d. The practice of cutting steak slices thicker than required, then cutting the slice practically in two, and folding it out to form one larger steak. |
| | | e. Inserting a boneless cut of meat in an elastic netting material so that the cut may retain its shape and hold together during cooking. |
| | | f. Placing two or more small pieces of meat together and then passing them through a tenderizing machine so that they hold together to make one larger steak. |
| | | g. Passing a slice of meat through a tenderizing machine two or three times. |

9. Must muscle groups be utilized to identify boneless cuts of beef?

- a. Yes.
- b. No.

10. Beef roasts and steaks may be produced from _____, _____, _____ cuts, or _____.

11. The boning of a cut must be accomplished with sufficient care to avoid objectionable _____.

12. Steaks are divided by straight cuts at approximately a _____ to the grain of the meat.

13. _____ is prohibited.

14. List the two muscles from institutional meat purchase specifications item number 112 that are part of the "lip."

15. Which of the following items contains the longissimus dorsi, rhomboideus, spinalis dorsi, complexus, multifidus dorsi, serratus ventralis, subscapularis, and splenius muscles?
 - a. Beef Rib, Ribeye Roll.
 - b. Beef Chuck, Shoulder Clod Roast, Special.
 - c. Beef Chuck, Chuck Roll.
 - d. Beef Loin, Top Sirloin Butt, Boneless.

16. Match the portion cut in Column II to the IMPS number in Column I.

COLUMN I

COLUMN II

- | | | |
|----------|---------------|---|
| (1) ____ | IMPS No. 112 | a. Beef Rib, Ribeye Roll |
| (2) ____ | IMPS No. 114B | b. Beef Rib, Ribeye Roll Steak |
| (3) ____ | IMPS No. 116A | c. Beef Chuck, Chuck Roll |
| (4) ____ | IMPS No. 167A | d. Beef Chuck, Shoulder Clod Roast, Special |
| (5) ____ | IMPS No. 171C | e. Beef Round, Knuckle, Peeled |
| (6) ____ | IMPS No. 1112 | f. Beef Round, Eye of Round |

17. Match the portion cut in Column II to the IMPS number in Column I.

COLUMN I

COLUMN II

- | | | |
|---------|----------------|---|
| (1) ___ | IMPS No. 184 | a. Flank, Flank Steak |
| (2) ___ | IMPS No. 189A | b. Beef Loin, Strip Loin Steak, Boneless, Center-Cut |
| (3) ___ | IMPS No. 191 | c. Beef Loin, Top Sirloin Butt Steak, Semi-Center-Cut, Boneless |
| (4) ___ | IMPS No. 193 | d. Beef loin, Tenderloin Steak |
| (5) ___ | IMPS No. 1180A | e. Beef Loin, Tenderloin, Full, Side Muscle On |
| (6) ___ | IMPS No. 1184A | f. Beef Loin, Top Sirloin Butt, Boneless |
| (7)___ | IMPS No. 1189 | g. Beef Loin, Tenderloin Butt |

18. Which item requires that the tensor fasciae latae muscle, fat, and "skin" tissue be removed?

- a. Beef Round, Eye of Round.
- b. Beef Rib, Ribeye Roll Steak.
- c. Beef Round, Knuckle, Peeled.
- d. Flank, Flank Steak.

19. Which item is separated from the top and outside rounds and heel between the natural seams?

- a. Beef Round, Eye of Round.
- b. Flank, Flank Steak.
- c. Beef Rib, Ribeye Roll.
- d. Beef Loin, Tenderloin Butt.

20. Which item includes the longissimus dorsi muscle and the spinalis dorsi, complexus, and multifidus dorsi muscles?
- Beef Loin, Top Sirloin Butt, Boneless.
 - Beef Rib, Ribeye Roll.
 - Beef Chuck, Shoulder Clod Roast, Special.
 - Beef Loin, Top Sirloin Butt Steak, Semi Center-Cut, Boneless.
21. Select the item in which, on the round end, the biceps femoris muscle is equal to or larger than the gluteus medius muscle.
- Beef Loin, Tenderloin Butt.
 - Beef Loin, Tenderloin, Full, Side Muscle On.
 - Beef Loin, Top Sirloin Butt, Boneless.
 - Beef Loin, Strip Loin, Steak, Boneless, Center-Cut.
22. Select the item that exposes, on the round end, the psoas major muscle and the iliacus and sartorius muscles.
- Beef Loin, Tenderloin Butt.
 - Beef Loin, Strip Loin Steak, Boneless, Center-Cut.
 - Beef Loin, Top Sirloin Butt, Semi Center-Cut, Boneless.
 - Beef Loin, Tenderloin Steak.

23. Which steak must be practically free of fat and membranous tissue? (Identify by the IMPS item number.)
- a. 193.
 - b. 1112.
 - c. 1173.
 - d. 1180A.
 - e. 1189.
24. The steak that consists of the rectus abdominis muscle is the _____ steak.
- a. Beef Loin, Tenderloin Steak.
 - b. Beef Rib, Ribeye Roll, Steak.
 - c. Flank, Flank Steak.
 - d. Beef Loin, Strip Loin Steak, Boneless, Center-Cut.
25. Which item requires that the narrowest diameter of the cut surface of the psoas major muscle be a minimum of one inch?
- a. Beef Loin, Strip Loin Steak, Boneless, Center-Cut.
 - b. Beef Rib, Ribeye Roll Steak.
 - c. Beef Loin, Top Sirloin Butt Steak, Semi Center-Cut, Boneless.
 - d. Beef Loin, Tenderloin Steak.

26. Which item specifies that all muscles be removed except for the gluteus medius, the biceps femoris, and (optionally) the longissimus dorsi?
- a. Beef Loin, Top Sirloin Butt Steak, Semi- Center-Cut, Boneless.
 - b. Beef Rib, Ribeye Roll, Steak.
 - c. Beef Loin, Strip Steak, Special, Boneless.
 - d. Beef Loin, Tenderloin Steak.
27. To be acceptable as a portion cut, a score into the tenderloin must be no more than:
- a. 1/2 inch.
 - b. 1/4 inch.
 - c. 1 inch.
 - d. 2 inches.
28. Which item description requires that the "neck" be removed by a straight cut anterior to, but not more than 1/2 inch from, the serratus ventralis muscle?
- a. Beef Chuck, Chuck Roll.
 - b. Beef Rib, Ribeye Roll.
 - c. Beef Chuck, Shoulder Clod Roast, Special.
 - d. Beef Flank.

29. Which IMPS item number states that the item must contain the following muscles: the gluteus medius, the gluteus accessorius, the gluteus profundis, and the biceps femoris?
- a. 184.
 - b. 189A.
 - c. 191.
 - d. 1184A.
30. Select the IMPS item that specifies that at the rib end the longissimus dorsi muscle must be at least twice as large as the complexus muscle.
- a. Beef Rib, Ribeye Roll, Lip-On.
 - b. Beef Rib, Ribeye Roll.
 - c. Beef Chuck, Shoulder Clod Roast, Special.
 - d. Beef Chuck, Chuck Roll.
31. According to IMPS No. 191 and No. 1189, the muscle that comprises the tenderloin is the:
- a. Rectus femoris.
 - b. Iliacus.
 - c. Gluteus medius.
 - d. Psoas major.
32. It is abnormal for vacuum-packaged, boneless cuts to display a greenish or brownish color.
- a. True.
 - b. False.

33. The method of determining the fat content of raw meat products is called the _____.
34. This method utilizes the _____ for Ground Beef.
35. This machine is manufactured by the _____ Manufacturing Company.
36. The temperature of the heating element should be checked _____ a week.
37. A minimum temperature of _____ F should be obtained.
38. The time required to extract the fat from the sample is:
- a. 5 minutes.
 - b. 10 minutes.
 - c. 15 minutes.
 - d. 20 minutes.
39. The meat sample has a _____ appearance at the end of the test period.
40. The sample size is _____ container.
41. The sample is ground through a plate having holes _____ inch in diameter.
42. The temperature of all sample units should not be less than _____ F. nor more than _____ F. at the time of testing.

43. The hairline pointer of the measuring device is in line with the _____ of the meniscus (concave portion) of the yellow fluid.
44. Fat percentage is read to the nearest _____ percent.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 4

1. seam (para 4-1e)
2. surface (para 4-1d)
3. rib eye (para 4-1i)
4. chuck eye (para 4-1j)
5. loin eye (para 4-1k)
6. grain of the meat (para 4-1s)
7.
 - a. A (para 4-1l)
 - b. Di (para 4-1m)
 - c. Do (para 4-1n)
 - d. Po (para 4-1o)
 - e. Px (para 4-1p)
 - f. V (para 4-1q)
8.
 - (1) e (para 4-1f)
 - (2) f (para 4-1g)
 - (3) g (para 4-1h)
 - (4) d (para 4-1a)
 - (5) a (para 4-1t)
 - (6) b (para 4-1u)
 - (7) c (para 4-1v)
9. a (para 4-2b)
10. wholesale cuts
boneless wholesale
carcass beef (para 4-3b)
11. scores (para 4-3b)
12. right angle (para 4-3b)
13. butterflying (para 4-3b)
14. Serratus dorsalis
Longissimus costarum (para 4-3c(1))
15. c (para 4-3c(4))

16. (1) a (para 4-3c(1))
(2) d (para 4-3c(3))
(3) c (para 4-3c(4))
(4) e (para 4-3c(5))
(5) f (para 4-3c(6))
(6) b (para 4-3c(11))
17. (1) e (para 4-3c(7))
(2) f (para 4-3c(8))
(3) g (para 4-3c(9))
(4) a (para 4-3c(10))
(5) b (para 4-3c(11))
(6) c (para 4-3c(12))
(7) d (para 4-3c(13))
18. c (para 4-3c(5))
19. a (para 4-3c(6))
20. b (para 4-3c(1))
21. c (para 4-3c(7))
22. a (para 4-3c(9))
23. a (para 4-3c(10))
24. c (para 4-3c(10))
25. d (para 4-3c(14))
26. a (para 4-3c(13))
27. a (para 4-3c(9))
28. a (para 4-3c(4))
29. a (para4-3c(7))
30. c (para 4-3c(3))
31. d (para 4-3c(9)&(14))
32. a (para 4-4e)

33. thermal extraction method (para 4-5(a))
34. fat percentage indicator (para 4-5 (a))
35. Hobart (para 4-5(a))
36. twice (para 4-5b(1)(a))
37. 380 (para 4-5b(1)(a))
38. c (para 4-5b(1)(c))
39. charred (para 4-5b(1)(d))
40. one (para 4-5b(3)(b))
41. 3/4 (para 4-5b(3)(c))
42. 34, 55 (para 4-5b(3)(d))
43. bottom (para 4-5b(7)(a))
44. whole (para 4-5b(7)(c))

End of Lesson 4

LESSON ASSIGNMENT

LESSON 5

Inspection of Wholesale Market Cuts of Pork and Pork Loin Roasts and Slices.

LESSON ASSIGNMENT

Paragraphs 5-1 through 5-8.

LESSON OBJECTIVES

After completing this lesson you should be able to:

- 5-1. Identify inspection procedures for wholesale market cuts of pork.
- 5-2. Identify inspection procedures for pork loin roasts and slices.

SUGGESTION

After studying the assignment, complete the exercises of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 5

INSPECTION OF WHOLESALE MARKET CUTS OF PORK AND PORK LOIN ROASTS AND SLICES

Section I. INTRODUCTION TO PORK

5-1. GENERAL

a. **Overview.** Pork is a very important item on the military menu. Pork provides a variety of items, some of which are loins, pork slices, roasts, spareribs, ham, and bacon. The Armed Forces procure primal cuts, portion cuts, and canned products. The military also purchases smoked pork products.

b. **Pork Fat.** Some pork cuts are cured and smoked; this increases the shelf life of the product and changes the flavor and appearance of the meat. Pork can be smoked better than other meat because of the amount and distribution of fat throughout the carcass, but this fat also makes rancidity a major concern. The type of feed the hog was fed influences the fat. The hogs fed garbage, peanuts, acorns, and soybeans have a low quality, soft, oily, yellowish fat with a low melting point. This fat is not resistant to finger pressure. Hogs fed corn and other grains have a high quality fat that is hard, white, and resists bending and finger pressure.

5-2. DIVIDING A PORK SIDE

After the carcass is dressed and chilled, it is taken to the cutting room where it is first divided into sides. Each side is then divided into three sections. The anterior section is made by a cut approximately perpendicular to the length of the side, posterior to, but not more than 1-inch from the tip of the elbow and shall not expose the elbow. The middle section is made with a straight cut 1 1/2 to 3 1/2 inches anterior to the aitch bone. The posterior section is the part that remains. A pork skeleton and the cuts that correspond to the various sections are shown in figure 5-1. Description of individual cuts obtained from these sections are given in the following paragraphs:

a. Anterior Section.

- (1) Jowl. The fatty portion anterior to the shoulder and below the jaw.
- (2) Shoulder. The portion that remains after the jowl and forefeet are removed (figure 5-2). The shoulder can be regular or skinned. A skinned shoulder has the upper half of the skin removed. The shoulder is divided further as follows:

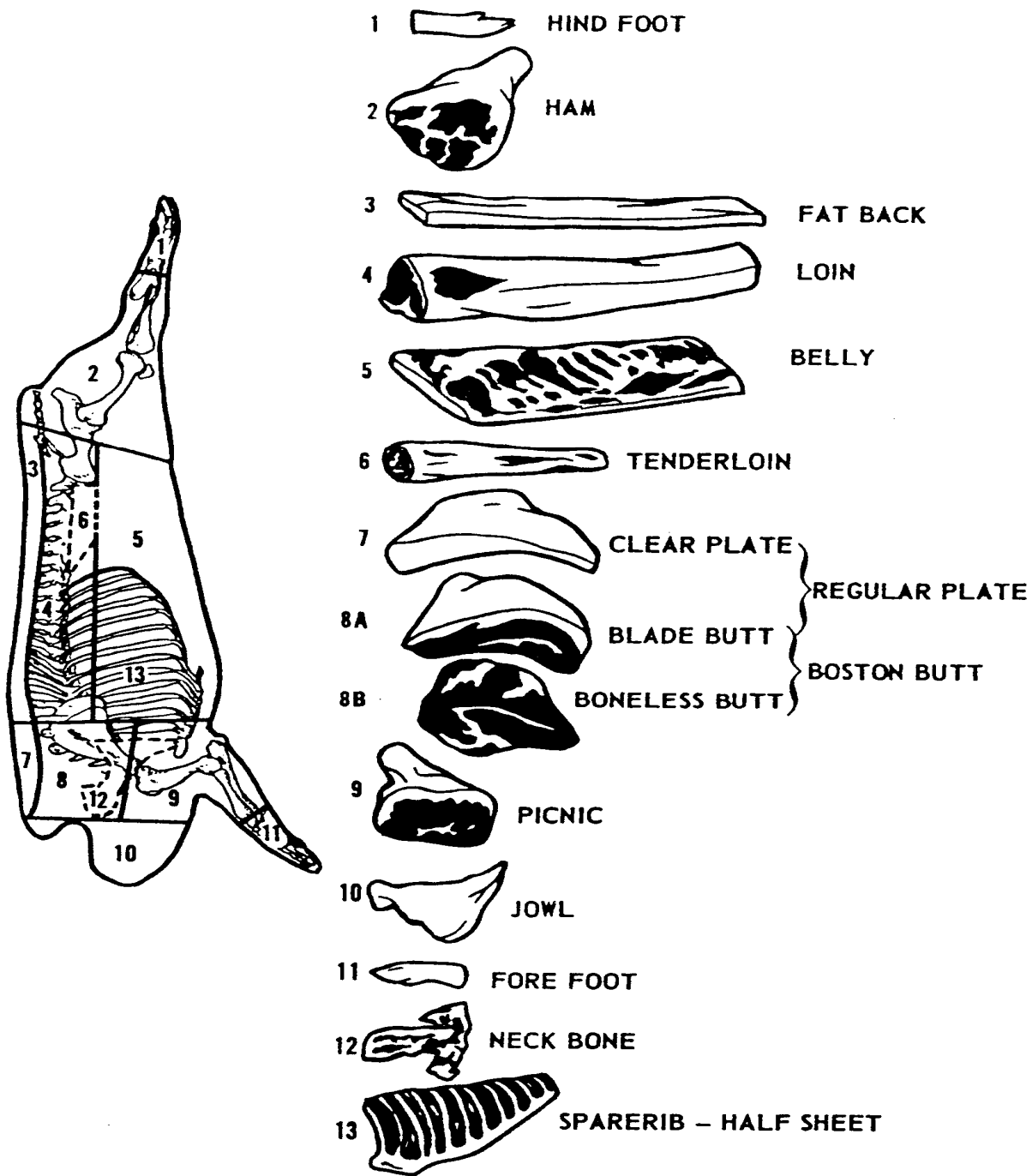


Figure 5-1. Pork cuts.

(a) Picnic. The lower half of the shoulder.

(b) Shoulder butt. This cut is subdivided into the regular plate, which is the skin side with the underlying fat; and the Boston butt, which is the remainder of the shoulder. These, in turn, form the clear plate, the blade butt, and the boneless butt.

(3) Feet. Only the forefeet are acceptable for military procurement.

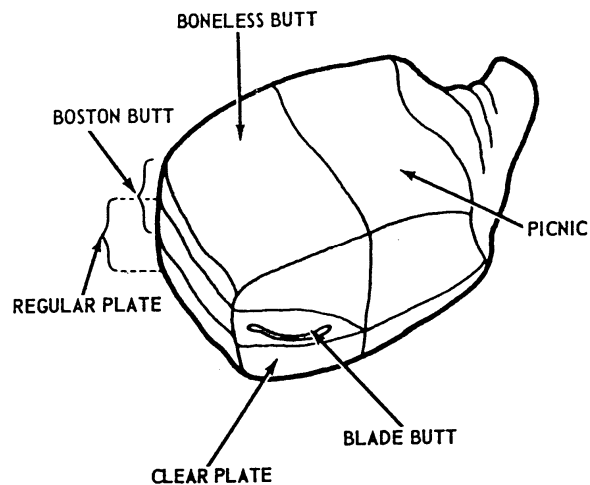


Figure 5-2. Breakdown of the pork shoulder.

b. Middle Section.

(1) Fatback. The layer of fat along the dorsal surface of the back.

(2) Loin. The portion of lean and fat immediately under the fatback. It contains the backbones, parts of the blade and pelvic bones, and the upper extremities of the ribs.

(3) Spareribs (half sheet). The lower portion of the ribs, removed in one piece. A half sheet of spareribs will contain all the ribs remaining in the middle section (11 to 13 ribs).

(4) Belly. The portion of the middle section that remains after the fatback, loin, and spareribs are removed.

c. Posterior Section.

(1) Ham. The ham is formed from the posterior section by removal of the tail and the foot. The tail is removed in such a manner as to form a well-rounded ham.

(2) Feet. The foot is removed at or above the hock joint, not exposing the marrow, and producing a star like formation at the point of severance called the star-joint. The hind feet are not acceptable for military procurement.

5-3. TRADE TERMS

The following are terms with which the veterinary food inspection specialist should be familiar.

a. **Curl** (dog ear). This is a small, tucked-in area on the anterior (brisket) end of the belly that corresponds to the armpit of a human. Some bacon contracts use the curl as a landmark for the removal of the brisket end.

b. **Seeds**. Mammary tissue, classified by color.

(1) White seeds indicate that the mammary tissue was inactive and helps determine that the carcass was derived from a gilt.

(2) Red seeds indicate active mammary glands; therefore, the pork may have come from a sow.

(3) Black seeds are pigmented mammary tissue.

c. **Belly Stripping**. This is the removal of thin slices along the belly edge to produce seedless bellies.

d. **Flank Pocket**. It is located near the posterior (flank) edge and is the thinnest area of the belly.

e. **Boot Jack**. A slight V-shaped configuration produced on the belly when the middle section is removed from the posterior section.

f. **Featherbone**. Large pieces of rib cartilage that remain on the belly, if the cartilages are small and embedded, they are called buttons.

g. **Comb Hanger**. Sharp-toothed hook on which the belly is hung in the smokehouse.

h. **Clear**. Use of this term indicates that all the bones have been removed.

i. **Scribe Line**. A slight score on the belly that is sometimes left by the saw when the ribs are cut in preparation for the removal of the loin and spareribs.

j. **Snowballing**. This is the removal of lean tissue to expose fat, also known as belly robbing.

k. **Streak of Lean.** The retractor penis muscle, which is observed on the untrimmed belly wall.

l. **Leaf Fat.** The heavy layer of fat that lines the inside surfaces of the abdominal cavities of hog carcasses.

m. **False Lean.** The trapezius and latissimus dorsi muscles that are imbedded in the fat overlying the pork shoulder or loin.

5-4. TERMS FOR HAM SURFACES

To properly inspect hams, the inspector should be familiar with the terms used for the surfaces of hams.

- a. **Face.** The inside surface of the ham with the aitch bone exposed.
- b. **Cushion.** The meaty, posterior edge of the ham that is opposite the flank edge.
- c. **Flank Side.** The anterior or forward edge of the ham, opposite the cushion.
- d. **Skin Side.** The outside or lateral side of the ham.
- e. **Butt End.** The surface where the cut was made to remove the posterior section from the side.
- f. **Shank End.** The end of the ham where the foot was removed.
- g. **Wrinkle or Crease.** The point where the cushion and shank join.
- h. **Collar.** The portion of skin remaining on the shank end of the ham after trimming.
- i. **Collar Line.** The point on a skinned ham after removal of the skin.

5-5. SEX TERMS

a. General. The official standards for swine were developed and are currently amended and maintained by the USDA. They provide for segregation of swine first according to its intended use, either slaughter or feeder swine, then as to the class as determined by sex condition, and then as to grade, which is determined by the apparent relative excellence and desirability of the animal for a particular use. The difference between slaughter and feeder is slaughter swine are those that are intended for slaughter immediately or in the near future and feeder swine are intended for slaughter after a period of feeding. The military procures only barrows and gilts.

b. **Five Classes of Slaughter or Feeder Swine.** Since sex has no effect on their physical characteristics, the inspector does not need to differentiate between male and female carcasses. They are treated as a single class for grading. The classes are as follows:

(1) Boar. A mature male swine that has not been castrated and is used for breeding purposes (corresponds to a bull).

(2) Barrow. A male swine castrated when young and before development of the secondary physical characteristics (reaching sexual maturity) of a boar. (corresponds to a steer).

(3) Stag. A male swine castrated after development or beginning of development of the secondary physical characteristics (reaching sexual maturity) of a boar.

(4) Sow. A mature female swine that usually shows evidence of having reproduced. (corresponds to a cow).

(5) Gilt. A young female swine that has not produced young. (corresponds to a heifer).

5-6. QUALITY GRADES

Although there are USDA quality grades for pork, these do not carry through to the retail level, as do the grades for other kinds of meat. Because of this consistency, USDA grades for pork reflect only two levels of quality, Acceptable and Unacceptable. Acceptable quality pork is then graded for yield, that is, the yield ratio of lean to waste. Unacceptable quality pork which includes meat that is soft and watery is graded U.S. Utility. The quality of pork is determined by the lean and firmness of the fat, and the characteristics related to the combined carcass yields of the four lean cuts, ham, loin, picnic shoulder, and Boston butt. The official grades of slaughter barrows and gilts are:

- a. United States Number 1.
- b. United States Number 2.
- c. United States Number 3.
- d. United States Number 4.
- e. United States Utility.

NOTE: The Armed Forces does not normally procure hogs in the form of carcasses. Market cuts are purchased, and they are normally from carcasses, which would be graded as US Number 1 or US Number 2.

Section II. INSPECTION OF WHOLESALE MARKET CUTS OF PORK AND PORK LOIN ROASTS AND SLICES

5-7. GENERAL

a. This section identifies the criteria used to determine compliance with the identity, condition, quality, and quantity requirements when inspecting wholesale market cuts of pork and pork loin roasts. The subject matter in this section will be presented from the viewpoint of the IMPS. See figures 5-1 and 5-2 for illustrations. The veterinary food inspection specialist will apply all of the steps learned in Section III of Lesson 3 when inspecting any red meat item.

b. To determine the lot size, the inspector must multiply the number of units per case by the total number of cases.

c. Sampling will be in accordance with the inspection data packet.

(1) The sample unit will be one unit (or cut) of product, or the contents of one shipping container.

(2) If more than one style is present in the lot, samples should be taken proportionately from the various styles.

(3) Select sample units at random throughout the lot. For example, if units are packed five per case and your sample size is three, select one unit from each of three cases.

5-8. IDENTITY/QUALITY INSPECTION

a. **Reference.** Use the reference that is specifically mentioned in the contractual documents to determine identity. Either the NAMP's, The Meat Buyer's Guide or the USDA's IMPS General Requirements, IMPS Quality Assurance Provisions and IMPS for Fresh Pork--Series 400. The reference not specifically identified in the inspection data packet can be used as a guide.

b. **Material Requirements.**

(1) The purchaser will specify grade and / or maximum fat thickness.

(2) The purchaser will specify the portion weight and / or thickness desired.

(3) Product must be in excellent condition.

(4) Exposed lean and fat surfaces shall be of a color and bloom normally associated with the class, grade, and cut of meat, and typical of meat which has been properly stored and handled. Cut surfaces and naturally exposed lean surfaces shall show no more than a slight darkening or discoloration due to dehydration, aging, and / or microbial activity. The fat shall show no more than very slight discoloration due to oxidation or microbial activity.

(5) No odors foreign to fresh meat shall be present.

(6) The product should show no evidence of freezing, defrosting, or mishandling. Pork must be maintained in excellent condition through processing, storage, and transit.

(7) All pork shall be practically free of bruises, blood clots, bloody tissue, blood discoloration, exposed spinal cord portions, or any other conditions that would negatively affect the use of the product.

(8) The lean must be at least slightly firm, possess a bright, reasonably uniform color (slight two-toned color is permissible), ranging from light pink to light red, have a fine, smooth texture and exhibit no evidence of the pale, soft, and exudative (PSE) condition.

(9) The skin must be thin, smooth, and pliable. Dark, coarse textured lean or oily and soft fat shall not be acceptable.

(10) The cutting, trimming, and boning of the cuts shall be accomplished with sufficient care to allow each cut to retain its identity and to avoid objectionable scores in the lean meat. Ragged edges will be removed close to the lean surface, except for cuts that are separated through natural seams. All cut surfaces shall form approximate right angles with the skin surface with the exception of specifically defined cut separations.

(11) No more than a slight amount of lean, fat, or bone shall be removed or included from an adjacent cut.

(12) Fresh hams, shoulders, shoulder picnics, Boston butts, and loins must have at least a moderate degree of meatiness. This is based on a composite evaluation of thickness of muscling and quantity of intermuscular and external fat.

(13) Bellies must indicate at least a slightly high ratio of lean to fat and have uniform distribution of fat and lean layers.

(14) Bones must not be ossified to a degree that cartilage is not evident in the pelvic, spinal, and scapular sections. The split chine bones, spinous processes, and cross-cut sections of bones must be porous. The color of the bones will range from red to deep pink. The exterior surface of the rib bones must show at least some redness.

(15) Cuts shall be free of dislocated or enlarged joints or other malformations of the skeletal structure.

c. **Identity of Product.** Identify the wholesale market cut and then compare the cut to the requirements in the inspection data packet for identity, quality, and quantity (net weight and count). The IMPS item number refers to the method by which the pork is cut, the following item descriptions are excerpts from the IMPS and are not complete. (Refer to figure 5-2 as needed).

(1) Institutional Meat Purchase Specifications Item Number 400-Pork Carcass. The carcass shall be dressed “packer style”; that is, without the head and kidneys and practically free of internal fat. There shall not be any objectionable scores on the outside of the carcass and, unless otherwise specified, the carcass shall be skinned. Mutilated feet must be removed at the hock or upper knee joint. Carcasses with a “stuck” shoulder are unacceptable. The membranous portion of the diaphragm must be removed close to the lean, although the lean portion and the membrane surrounding the lean portion may remain if firmly attached to the carcass. The jowl may remain intact with each carcass side, except that minor trimming is acceptable for removal of bloody portions and ragged edges. The carcasses shall be split into reasonably uniform sides by cutting lengthwise through the backbone so that the major muscles of the loin and shoulder are not scored and such that the spinal cord groove is evident on at least 75 percent of both sides of the backbone.

(2) Institutional Meat Purchase Specifications Item Number 401-Pork Leg (Fresh Ham). The leg is separated from the side by a straight cut approximately perpendicular to a line parallel to the shank bones. The cut passes through a point that is not less than 1 1/2 inches (38 mm) and not more than 3 1/2 inches (89 mm) from the anterior edge of the aitch bone. The foot shall be removed at or slightly above the hock joint. The tail, vertebrae, flank muscle (rectus abdominis), cutaneous trunci, prefemoral lymph gland, and any other exposed lymph glands shall be removed. The skin and collar fat over the semimembranosus (cushion) shall be smooth and well rounded such that the innermost curvature of the skin is trimmed back at least half the distance from the stifle joint to the posterior edge of the aitch bone. The skin overlying the medial side (inside) of the quadriceps femoris shall be removed and fat overlying the quadriceps femoris and pelvic area shall be removed close to the lean. The fat thickness beneath the leg face measured at the skin edge and directly under the bone shall not exceed that indicated in the following schedule:

<u>Weight Range of Ham In Pounds</u>	<u>Maximum Fat Thickness</u>
A. 14-17 (6.4--7.7 kg)	1 1/4 in (32 mm)
B. 17-20 (7.7--9.1 kg)	1 1/2 in (38 mm)
C. 20-26 (9.1--11.8 kg)	1 3/4 in (44 mm)
D. 26 (11.8 kg) and up	2.0 in (51 mm)

(3) Institutional Meat Purchase Specifications Item Number 401A - Pork Leg (Fresh Ham), Short Shank. The fresh ham is as described in item number. 401 except the shank shall be removed by a straight cut made at an approximate right angle to the shank bones exposing a cross section of the gastrocnemius.

(4) Institutional Meat Purchase Specifications Item Number 402-Pork Leg (Fresh Ham), Skinned. This item is as described in Item No. 401 except the skin and fat on the outside of the ham shall be trimmed. The skin shall be removed anterior to a straight line parallel to the leg face, which starts at a point that does not exceed 25 percent of the distance from the stifle joint to the leg face. The fat exposed by the removal of the skin shall be trimmed not to exceed 2 inch (50 mm) in depth at any point, which is 1 1/2 inches (38 mm) or more from the skin edge, except at the tail end of the pelvic area, and the fat thickness shall not exceed 1.0 inch (25 mm).

(5) Institutional Meat Purchase Specifications Item Number 402B-Pork Leg (Fresh Ham), Boneless. This item is prepared from Item No. 401. All bones, cartilage, skin, flank muscle (rectus abdominis), cutaneous trunci, fat and lean above the aitch bone and exposed lymph glands shall be removed. The tendinous ends of shanks shall be removed so that the cross sectional cut exposes not less than 75 percent lean. All surface fat in excess of 1/2 inch (13 mm) in depth shall be removed. The loin end shall be exposed by a straight cut anterior to the quadriceps femoris. The cut shall not be less than 1.0 inch (25 mm) and not more than 3.0 inches (75 mm) from the anterior end of the femur pocket. Shank meat which is firmly attached may remain and shall be folded into the femur cavity. The ham shall be netted or tied.

(6) Institutional Meat Purchase Specifications Item Number 402C-Pork Leg (Fresh Ham), Boneless, Short Shank, Trimmed. The fresh leg is as described in Item No. 402B except the popliteal lymph gland and surrounding fat in excess of 1/4 inch (6 mm) in depth shall be removed. The shank shall be removed by a straight cut made at an approximate right angle to the length of the shank exposing the gastrocnemius.

(7) Institutional Meat Purchase Specifications Item Number 403-Pork Shoulder. The shoulder is separated from the side by a straight cut, approximately perpendicular to the length of the side, posterior to, but not more than 1.0 inch (25 mm) from, the tip of the elbow and shall not expose the elbow. The outer tip of the subscapularis muscle shall not extend past the dorsal edge of the base of the medial ridge of the blade bone. The foot shall be removed at or slightly above the upper knee joint by a straight cut approximately perpendicular to the shank bones. The jowl shall be removed by a straight cut approximately parallel with the loin side, which is anterior to but not more than 1.0 inch (25 mm) from the innermost curvature of the ear dip. The neck bones, ribs, breast bones, associated cartilage, and breast flap (through the major crease) shall be removed. The fat and skin shall be beveled to meet the lean on the dorsal edge. The exterior fat thickness at the dorsal skin edge, measured at the center of the cut, shall not exceed that indicated in the following schedule:

<u>Weight Range of Shoulder In Pounds</u>	<u>Maximum Fat Thickness</u>
A. 8-12 (3.6--5.5 kg)	1 1/4 in. (32 mm)
B. 12-16 (5.5--7.3 kg)	1 1/2 in. (38 mm)
C. 16-20 (7.3--9.1 kg)	1 3/4 in. (44 mm)
D. 20 (9.1 kg) and up	2.0 in. (51 mm)

(8) Institutional Meat Purchase Specifications Item Number 405-Pork Shoulder, Picnic. This item is prepared from Item Number 403. The butt shall be removed by a straight cut, dorsal to the shoulder joint, at an approximate right angle with the belly side. The jowl shall be removed by a straight cut approximately parallel with the belly side that is not more than 1.0 inch (25 mm) anterior from the half moon muscle (pectorales profundi), measured on the butt side. The fat and skin shall be beveled to meet the lean on the dorsal edge. The fat thickness, measured at the center of the butt side, shall not exceed that indicated in the following schedule:

<u>Weight Range of Shoulder Picnic (pounds)</u>	<u>Maximum Fat Thickness</u>
A. 4-6 (1.8--2.7 kg)	5/8 in. (18 mm)
B. 6-8 (2.7--3.6 kg)	3/4 in. (19 mm)
C. 8-12 (3.6--5.5 kg)	1.0 in. (25 mm)
D. 12 (5.5 kg and up)	1 1/4 in. (32 mm)

(9) Institutional Meat Purchase Specifications Item Number 406-Pork Shoulder, Boston Butt. This item is as described in Item No. 403 except that the picnic is removed as described in item number 405. All fat in excess of 1/4 inch (6 mm) in depth, neck bones, related cartilage, and skin shall be removed.

(10) Institutional Meat Purchase Specifications Item Number 410-Pork Loin. The loin is that portion of the side remaining after removal of the shoulder, ham, belly, and fat back leaving a portion of the blade bone, its overlying lean and fat, not less than two sacral, but no caudal, vertebrae on the loin. The shoulder and leg shall be separated from the loin by straight cuts which are reasonably perpendicular to the split surface of the backbone. The outer tip of the subscapularis muscle shall not extend past the center of the base of the medial ridge of the blade bone. The belly side shall be removed by a straight cut (a slight dorsal curvature is acceptable) which extends from a point which is ventral to but not more than 3.0 inches (76 mm) from the longissimus dorsi on the shoulder end, to a point on the ham end ventral to but not more than 1/2 inch (13 mm) from the tenderloin. Surface fat shall be trimmed to an average of 1/4 inch (6 mm) in depth or less except in the hip bone area. The hip bone area is defined as the area contained within two parallel lines, 2.0 inches (51 mm) on either side of the anterior end of the hip bone and associated cartilage. Fat in the hipbone area shall be trimmed to the same contour as the rest of the trimmed fat surface of the loin. At least 2.0 inches (51 mm) of the false lean shall be exposed. Lumbar and pelvic fat shall be trimmed to 1/2 inch (13 mm) or less in depth. The tenderloin shall remain intact. The diaphragm and hanging tender shall be removed. The spinal cord groove shall be evident on at least 75 percent of the vertebrae.

(11) Text Institutional Meat Purchase Specifications Item Number 411-Pork Loin.

Bladeless. The loin is as described in Item No. 410 except the blade bone, associated cartilage, and overlying lean and fat shall be removed. On the shoulder end, the longissimus dorsi shall be equal to or larger than the combined areas of the splenius and semispinalis capitis.

(12) Institutional Meat Purchase Specifications Item Number 413-Pork Loin, Boneless. This item is prepared from item number 410. All skin, bones, cartilages, the tenderloin, and lean and fat overlying the blade bone shall be removed. The ham end of the loin shall be exposed by a straight cut which shows no evidence of the quadriceps femoris or the longissimus dorsi. The sirloin may be removed immediately anterior to the hipbone pocket. In such cases, both the longissimus dorsi and gluteus medius shall be exposed on the "leg" end. On the shoulder end, the longissimus dorsi shall be equal to or larger than the combined areas of the splenius and semispinalis capitis. The belly shall be removed by a cut from a point ventral to but not more than 2.0 inches (51 mm) from the longissimus dorsi at the shoulder end to a point on the ham end, no more than 1.0 inch (25 mm), ventral to the longissimus dorsi and/or gluteus medius (a slight dorsal curvature is acceptable). Surface fat shall not exceed 1/4 inch (6 mm) in depth, except in the hip pocket.

(13) Institutional Meat Purchase Specifications Item Number 413A-Pork Loin, Roast, Boneless. The loin is as described in item number 413 except that the boneless loin shall be cut into two pieces of approximately equal length. The pieces shall be positioned with the boned surfaces together. The halves shall be trimmed so that neither half extends more than 1/2 inch (13 mm) past its opposing half. The boneless loin shall be netted or tied.

(14) Institutional Meat Purchase Specifications Item Number 413B-Pork Loin, Boneless, Special. This item is as described in item number 413A, except that the belly shall be removed immediately ventral to the longissimus dorsi and/or gluteus medius. The iliocostalis and the obliquus internus abdominis muscles shall be removed. Powdered wheat gluten or other binding agents may be used. Binding agents and their application shall be in accordance with FSIS Regulations. The purchaser may specify the use of other binding agents. When binding agents other than wheat gluten are used, the product name shall be changed accordingly. Binding agents shall be used to bind the boned surface of each half of the loin together. (In lieu of string tying, it is permissible to enclose roasts in stretchable netting.)

(15) Institutional Meat Purchase Specifications Item Number 413B-Pork Loin, End Chops, Boneless. These boneless chops are prepared from the blade and sirloin portions of any IMPS boneless loin.

<u>Weight Range of Shoulder In Pounds</u>	<u>Maximum Fat Thickness</u>
A. 8-12 (3.6--5.5 kg)	1 1/4 in. (32 mm)
B. 12-16 (5.5--7.3 kg)	1 1/2 in. (38 mm)
C. 16-20 (7.3--9.1 kg)	1 3/4 in. (44 mm)
D. 20 (9.1 kg) and up	2.0 in. (51 mm)

(8) Institutional Meat Purchase Specifications Item Number 405-Pork Shoulder, Picnic. This item is prepared from item number 403. The butt shall be removed by a straight cut, dorsal to the shoulder joint, at an approximate right angle with the belly side. The jowl shall be removed by a straight cut approximately parallel with the belly side that is not more than 1.0 inch (25 mm) anterior from the half moon muscle (pectorales profundi), measured on the butt side. The fat and skin shall be beveled to meet the lean on the dorsal edge. The fat thickness, measured at the center of the butt side, shall not exceed that indicated in the following schedule:

<u>Weight Range of Shoulder Picnic (pounds)</u>	<u>Maximum Fat Thickness</u>
A. 4-6 (1.8--2.7 kg)	5/8 in. (18 mm)
B. 6-8 (2.7--3.6 kg)	3/4 in. (19 mm)
C. 8-12 (3.6--5.5 kg)	1.0 in. (25 mm)
D. 12 (5.5 kg and up)	1 1/4 in. (32 mm)

(9) Institutional Meat Purchase Specifications Item Number 406-Pork Shoulder, Boston Butt. This item is as described in item number 403 except that the picnic is removed as described in item number 405. All fat in excess of 1/4 inch (6 mm) in depth, neck bones, related cartilage, and skin shall be removed.

(10) Institutional Meat Purchase Specifications Item Number 410-Pork Loin. The loin is that portion of the side remaining after removal of the shoulder, ham, belly, and fat back leaving a portion of the blade bone, its overlying lean and fat, not less than two sacral, but no caudal, vertebrae on the loin. The shoulder and leg shall be separated from the loin by straight cuts which are reasonably perpendicular to the split surface of the backbone. The outer tip of the subscapularis muscle shall not extend past the center of the base of the medial ridge of the blade bone. The belly side shall be removed by a straight cut (a slight dorsal curvature is acceptable) which extends from a point which is ventral to but not more than 3.0 inches (76 mm) from the longissimus dorsi on the shoulder end, to a point on the ham end ventral to but not more than 1/2 inch (13 mm) from the tenderloin. Surface fat shall be trimmed to an average of 1/4 inch (6 mm) in depth or less except in the hip bone area. The hip bone area is defined as the area contained within two parallel lines, 2.0 inches (51 mm) on either side of the anterior end of the hip bone and associated cartilage. Fat in the hipbone area shall be trimmed to the same contour as the rest of the trimmed fat surface of the loin. At least 2.0 inches (51 mm) of the false lean shall be exposed. Lumbar and pelvic fat shall be trimmed to 1/2 inch (13 mm) or less in depth. The tenderloin shall remain intact. The diaphragm and hanging tender shall be removed. The spinal cord groove shall be evident on at least 75 percent of the vertebrae.

c. **Determine Age at Delivery.** The inspector determines the age of the product at delivery and the remaining shelf life and compares it to the requirements listed in the inspection data packet.

d. **Determine Temperature.** Determine the product temperature and compare it with the requirements given in the inspection data packet.

e. **Inspect for Abnormalities.** Examine the cuts of pork for any abnormalities (lesson 1, paragraph 1-14). The veterinary food inspection specialist does this inspection by visual, tactile, and olfactory examination.

Continue with Exercises

EXERCISES, LESSON 5

INSTRUCTIONS. The following exercises are to be answered by marking the lettered response that best answers the question, or by completing the incomplete statement, or by writing the answer in the space provided at the end of the question. After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers.

1. Pork cuts are smoked better than other meats due to the amount and distribution of fat.
 - a. True.
 - b. False.

2. Hogs fed on soybeans, acorns, peanuts, and garbage have a low quality fat with a low melting point that is _____, _____, and _____.

3. Hogs fed on corn and other grains have fat that is _____, _____ and resists _____.

4. A pork side is normally divided into _____ sections.

5. The anterior section of a pork side is made with a cut not more than _____ inch posterior to the _____.

6. List the three primary cuts from the anterior section of the pork carcass.

7. The shoulder consists of the _____ and _____.

8. The shoulder butt consists of the _____ and the _____.
9. Three cuts are formed from the regular plate and the Boston butt. These cuts are the _____, the blade butt, and the _____.
10. The middle section of a pork side is divided from the posterior section with a straight cut _____ to _____ inches anterior to the _____ bone.
11. List the cuts from the middle section of the pork carcass.

12. How many ribs are there in a half sheet of spareribs?

13. Match the trade term in Column I to the definition in Column II.

COLUMN I

COLUMN II

- | | |
|-------------------------|--|
| (1) ___ Curl (dog ear) | a. Thinnest area of the belly (near the posterior edge) |
| (2) ___ White seeds | b. Slight, V-shaped configuration on the belly |
| (3) ___ Red seeds | c. Small, tucked-in area on the anterior edge of the belly |
| (4) ___ Belly stripping | d. Inactive mammary tissue, derived from a gilt |
| (5) ___ Flank pocket | e. Active mammary tissue, derived from a sow |
| (6) ___ Boot jack | f. Thin slicing of the belly edge, resulting in a seedless belly |

14. The boot jack is located on which cut of pork?

- a. Shoulder
- b. Belly
- c. Loin
- d. Ham

15. Match the trade term in Column I to the definition in Column II.

COLUMN I

COLUMN II

- | | |
|------------------------|---|
| (1) ___ Featherbone | a. The retractor penis muscle, on the belly wall |
| (2) ___ Comb hanger | b. The removal of lean tissue, to expose fat |
| (3) ___ Clear | c. A slight score on the belly, when the ribs are cut |
| (4) ___ Scribe line | d. The removal of all the bones |
| (5) ___ Snowballing | e. Sharp-toothed hook, where the belly is hung |
| (6) ___ Streak of lean | f. Large pieces of rib cartilage that remain on the belly |

16. The _____ is the portion of skin remaining on the shank end of a ham after trimming.

17. The _____ _____ is the point on a skinned ham after the skin is removed.

18. Match the definition in Column II to the term for ham surfaces in Column I.

COLUMN I

COLUMN II

- | | |
|------------------------|--|
| (1) ___ Face | a. Where the posterior section was removed from the side |
| (2) ___ Cushion | b. Where the foot was removed |
| (3) ___ Skin side | c. Where the cushion and shank join |
| (4) ___ Butt end | d. The inside surface with the aitch bone exposed |
| (5) ___ Shank end | e. The meaty, posterior edge |
| (6) ___ Wrinkle/crease | f. The outside or lateral side |

19. The only classes of pork purchased for the Armed Forces are _____ and _____ .

20. Match the definition in Column II to the official class in Column I.

COLUMN I

COLUMN II

- | | |
|----------------|--|
| (1) ___ Boar | a. A young female swine |
| (2) ___ Barrow | b. An adult female swine |
| (3) ___ Stag | c. Mature male swine (not castrated) |
| (4) ___ Sow | d. Male swine castrated <u>before</u> reaching sexual maturity |
| (5) ___ Gilt | e. Male swine castrated <u>after</u> reaching sexual maturity |

21. Select the USDA official grade of slaughter pork procured by the Armed Forces?
 - a. United States Number 2.
 - b. United States Number 3.
 - c. United States Number 4.
 - d. United States Utility.

22. Pork lean ranges from _____ to _____ in color.

23. A slight _____ color is permissible.

24. The skin must be _____, _____, and _____.

25. The color of the bones ranges from _____ to _____.

26. Pork carcasses must be dressed _____.

27. The _____ will customarily remain intact with each carcass side.

28. To separate a carcass into two uniform sides the splitting is done lengthwise through the _____.

29. On a ham, the foot is removed at or above the _____ joint.

30. Which of the following market cuts exposes the quadriceps femoris muscle?
- Pork Loin.
 - Pork Shoulder.
 - Pork Spareribs.
 - Pork Leg (Fresh Ham).
31. Which of the following market cuts include the semimembranosus muscle?
- Pork Loin, Bladeless.
 - Pork Shoulder, Picnic.
 - Pork Leg (Fresh Ham), Skinned.
 - Pork Tenderloin.
32. The rectus abdominis muscle is removed from IMPS:
- 402C.
 - 403.
 - 406.
 - 413B.
33. Match the market cut in Column II to the IMPS in Column I.

COLUMN I

COLUMN II

- | | |
|-------------------|---|
| (1) ___ IMPS 401 | a. Pork Leg, (Fresh Ham), Boneless |
| (2) ___ IMPS 401A | b. Pork Leg, (Fresh Ham), Boneless, Short Shank |
| (3) ___ IMPS 402 | c. Pork Leg, (Fresh Ham) |
| (4) ___ IMPS 402B | d. Pork Leg, (Fresh Ham), Short Shank |
| (5) ___ IMPS 402C | e. Pork Leg, (Fresh Ham), Skinned |

34. If a ham weighs 15 pounds, the maximum fat thickness permitted is ____ inches.
35. Fat thickness of a ham is measured directly under the bone at the:
- a. Flank side.
 - b. Face.
 - c. Skin side.
 - d. Cushion.
 - e. Butt end.
36. Match the market cut in Column II to the IMPS in Column I.

COLUMN I

COLUMN II

- | | |
|-------------------|----------------------------------|
| (1) ____ IMPS 403 | a. Pork Shoulder, Boston butt |
| (2) ____ IMPS 405 | b. Pork Spareribs |
| (3) ____ IMPS 406 | c. Pork Loin, Country-Style Ribs |
| (4) ____ IMPS 416 | d. Pork Shoulder |
| (5) ____ IMPS 423 | e. Pork Shoulder Picnic |

37. Match the market cut in Column II to the IMPS in Column I.

COLUMN I

COLUMN II

- | | |
|--------------------|-----------------------------------|
| (1) ___ IMPS 410 | a. Pork Loin |
| (2) ___ IMPS 411 | b. Pork Tenderloin |
| (3) ___ IMPS 413 | c. Pork Loin, Boneless, Special |
| (4) ___ IMPS 413A | d. Pork Loin, Roast, Boneless |
| (5) ___ IMPS 413B | e. Pork Loin, Boneless |
| (6) ___ IMPS 415 | f. Pork Loin, End Chops, Boneless |
| (7) ___ IMPS 1413B | g. Pork Loin, Bladeless |

38. According to IMPS 401, the ham is separated from the side by a straight cut near the anterior edge of the aitch bone. The cut must not be less than _____ inch(es) and not more than _____ inch(es) from the bone.

- a. 2; 4.
- b. 1; 3.
- c. 1 1/2; 3 1/2.

39. Which market cut exposes a cross-section of the gastrocnemius muscle?

- a. Pork Leg, (Fresh Ham).
- b. Pork Leg, (Fresh Ham), Short Shank.
- c. Pork Leg, (Fresh Ham), Skinned.
- d. Pork Leg, (Fresh Ham), Boneless.

40. Which IMPS specifies that fat must be trimmed so as not to exceed 2 inches in depth at any point except the tail end?
- a. 401.
 - b. 401A.
 - c. 402.
 - d. 413.
41. Which market cut specifies that the cross-sectional cut expose not less than 75 percent lean meat?
- a. Pork Leg, (Fresh Ham).
 - b. Pork Leg, (Fresh Ham), Short Shank.
 - c. Pork Leg, (Fresh Ham), Skinned.
 - d. Pork Leg, (Fresh Ham), Boneless.
42. Which IMPS Item No. specifies that the popliteal lymph gland be removed and also fat in excess of 1/4 inch in depth?
- a. 401A.
 - b. 402B.
 - c. 402C.
 - d. 406.

43. Which market cut specifies that the subscapularis muscle must not extend past the dorsal edge of the medial ridge of the blade bone?
- a. Pork Shoulder.
 - b. Pork Loin, Boneless.
 - c. Pork Shoulder, Picnic.
 - d. Pork Shoulder, Boston Butt.
44. If a pork shoulder, picnic weighs 8 pounds, what is the maximum fat thickness permitted?
- a. 5/8 inch.
 - b. 3/4 inch.
 - c. 1 inch.
45. Which market cut includes the pectorales profundi muscle?
- a. Pork Shoulder, Picnic.
 - b. Pork Loin, Roast, Boneless.
 - c. Pork Shoulder, Boston Butt.
 - d. Pork Tenderloin.
46. If a pork shoulder weighs 15 pounds, what is the maximum fat thickness permitted?
- a. 1 1/4 inches.
 - b. 1 1/2 inches.
 - c. 1 3/4 inches.

47. Which market cut specifies that the neck bones, related cartilage, and skin be removed, as well as all fat in excess of 1/4 inch in depth?
- Pork Spareribs.
 - Pork Loin, Boneless.
 - Pork Shoulder, Boston Butt.
48. For the pork shoulder, picnic, fat thickness is measured at the:
- Center of the butt side.
 - Dorsal skin edge.
 - Skin edge directly under the bone.
49. Select the market cut, by IMPS that is NOT prepared from IMPS 410.
- 411.
 - 415.
 - 416.
 - 413.
50. Which market cut specifies that, on the shoulder end, the longissimus dorsi muscle must be equal to or larger than the combined areas of the splenius and the semispinalis capitis muscles?
- Pork Loin, Bladeless.
 - Pork Loin, Boneless.
 - Pork Loin, Roast, Boneless.
 - Pork Loin, Boneless, Special.
 - IMPS Items Nos. 411, 413, 413A, and 413B.

51. What is the binding agent for IMPS 413B?
- a. String tying.
 - b. Wheat gluten.
 - c. Stretchable netting.
 - d. Wire tying.
52. Which market cut is separated into equal halves with the boned surfaces placed together?
- a. Pork Tenderloin.
 - b. Pork Loin, Boneless.
 - c. Pork Loin, Bladeless.
 - d. IMPS Items 413A and 413B.
53. Which market cut is practically free of fat and consists of the psoas major, psoas minor, and iliacus muscles only?
- a. Pork Shoulder, Picnic.
 - b. Pork Spareribs.
 - c. Pork Tenderloin.
 - d. Pork Loin.

54. Complete the list of items that are to be removed from IMPS Item Number 413A.
- a. Diaphragm
 - b. Hanging tender
 - c. Lean and fat overlying the blade bone
 - d. _____.
 - e. _____.
 - f. _____.
 - g. _____.
55. Which market cut contains 11 ribs and associated costal cartilages?
- a. Pork Shoulder.
 - b. Pork Loin, Country-Style Ribs.
 - c. Pork Loin.
 - d. Pork Spareribs.
56. Which of the following IMPS Item Number is cut into two portions without severing the trapezius muscle cover?
- a. 416A.
 - b. 423.
 - c. 422.
 - d. 412.
57. How many ribs are there in country-style ribs?
- a. 3 to 6.
 - b. 11.
 - c. 8.

58. In lieu of string-tying, what other acceptable method may be used to enclose a boneless pork loin roast?
- a. Wire tying.
 - b. Plastic bagging.
 - c. Stretchable netting.
 - d. Cryovac.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 5

1. a (para 5-1b)
2. soft, oily, yellow (para 5-1b)
3. hard, white, bending (para 5-1b)
4. three (para 5-2)
5. 1, elbow (para 5-2)
6. Jowl (para 5-2a(1))
Shoulder (para 5-2a(2))
Feet (para 5-2a(3))
7. picnic (para 5-2a(2)(a))
shoulder butt (para 5-2a(2)(b))
8. Regular plate (para 5-2a(2)(b))
Boston butt (para 5-2a(2)(b))
9. clear plate (para 5-2a(2)(b); figure 5-1)
boneless butt (para 5-2a(2)(b); figure 5-1)
10. 1 1/2, 3 1/2, aitch (para 5-2)
11. Fatback (para 5-2b(1))
Loin (para 5-2b(1))
Spareribs (para 5-2b(1))
Belly (para 5-2b(1))
12. 11–13 (para 5-2b(3))
13. (1) c (para 5-3a)
(2) d (para 5-3b(1))
(3) e (para 5-3b(2))
(4) f (para 5-3c)
(5) a (para 5-3d)
(6) b (para 5-3e)
14. b (para 5-3e)

15. (1) f (para 5-3f)
(2) e (para 5-3g)
(3) d (para 5-3h)
(4) c (para 5-3i)
(5) b (para 5-3j)
(6) a (para 5-3k)
16. Collar (para 5-4h)
17. Collar line (para 5-4i)
18. (1) d (para 5-4a)
(2) e (para 5-4b)
(3) f (para 5-4d)
(4) a (para 5-4e)
(5) b (para 5-4f)
(6) c (para 5-4g)
19. barrows, gilts (para 5-5)
20. (1) c (para 5-5b(1))
(2) d (para 5-5b(2))
(3) e (para 5-5b(3))
(4) b (para 5-5b(4))
(5) a (para 5-5b(5))
21. a (para 5-6)
22. light pink, light red (para 5-8b(8))
23. two toned (para 5-8b(8))
24. thin, smooth, pliable (para 5-8b(9))
25. red, deep pink (para 5-8b(14))
26. packer style (para 5-8c(1))
27. jowl (para 5-8c(1))
28. backbone (para 5-8c(1))
29. hock (para 5-8c(2))
30. d (para 5-8c(2))

31. c (para 5-8c(4))
32. a (para 5-8c(6))
33. (1) c (para 5-8c(2))
(2) d (para 5-8c(3))
(3) e (para 5-8c(4))
(4) a (para 5-8c(5))
(5) b (para 5-8c(6))
34. 1 1/4 (para 5-8c(2))
35. b (para 5-8c(2))
36. (1) d (para 5-8c(7))
(2) e (para 5-8c(8))
(3) a (para 5-8c(9))
(4) b (para 5-8c(17))
(5) c (para 5-8c(18))
37. (1) a (para 5-8c(10))
(2) g (para 5-8c(11))
(3) e (para 5-8c(12))
(4) d (para 5-8c(13))
(5) c (para 5-8c(14))
(6) b (para 5-8c(16))
(7) f (para 5-8c(15))
38. b (para 5-8c(2))
39. b (para 5-8c(3))
40. c (para 5-8c(4))
41. d (para 5-8c(5))
42. c (para 5-8c (6))
43. a (para 5-8c (7))
44. c (para 5-8c(8))
45. a (para 5-8c(8))
46. b (para 5-8c(7))

- 47. c (para 5-8c(9))
- 48. a (para 5-8c(8))
- 49. c (para 5-8c(10) - (17))
- 50. e (para 5-8c(11) - (14))
- 51. b (para 5-8c(14))
- 52. d (para 5-8c(13)(14))
- 53. c (para 5-8c(16))
- 54. d. Skin (para 5-8c(12)(13))
e. Bones (para 5-8c(12)(13))
f. Cartilages (para 5-8c(12)(13))
g. Tenderloin (para 5-8c(12)(13))
- 55. d (para 5-8c(17))
- 56. b (para 5-8c(18))
- 57. a (para 5-8c(18))
- 58. c (para 5-8c(14))

End of Lesson 5

LESSON ASSIGNMENT

LESSON 6

Inspection of Cooked, Cured, and/or Smoked Products.

LESSON ASSIGNMENT

Paragraphs 6-1 through 6-25.

LESSON OBJECTIVES

After completing this lesson you should be able to:

- 6-1. Identify several curing agents and methods of curing meat.
- 6-2. Identify methods of smoking meat.
- 6-3. Identify classes and categories of sausages, types of sausage casings, and ingredients of sausages.
- 6-4. Identify external and internal sausage defects.

SUGGESTION

After studying the assignment, complete the exercises of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 6

INSPECTION OF COOKED, CURED, AND/OR SMOKED PRODUCTS

Section I. CURING MEAT

6-1. EARLY DEVELOPMENT

a. On a historical basis, meat curing may be defined as the addition of salt to meat for the purpose of preservation. The origin of curing meats by salting is unknown and may have begun quite by chance.

b. As the art progressed, additional substances were added to meat for curing purposes. As a result, the term meat curing eventually came to be understood as the addition of salt, saltpeter (nitrate), sugar, or in some instances, other ingredients for the purpose of preserving and flavoring meat. Again, the manner in which the utility of nitrate in meat curing first originated has been lost in antiquity, but it is safe to assume that its usefulness was discovered as the result of its being present as an impurity in the crude sodium chloride employed.

c. Prior to the turn of the century, it was found that nitrite accumulated in meat and meat-curing brine containing nitrate. Subsequent work indicated that the nitrite resulted from bacterial reduction of nitrate, and that nitrite was responsible for the production of the thermally stable meat pigment in cured meats. The use of nitrite in the curing of meats was studied by Lewis and Vose (1926). As a result of these studies, the Bureau of Animal Industry (BAI), USDA, issued Circular Number 1370 on October 19, 1925, which reads as follows:

To Inspectors in Charge of Meat Inspection and
Proprietors and Operators of Official Establishments:

Under the Provisions of Amendment 4 to BAI Order
211 (Revised), sodium nitrite may be used for curing
meats.

Extended experiments have demonstrated that
successful curing may be accomplished by the addition of
as small a quantity as one-fourth of an ounce of sodium
nitrite to each 100 pounds of meat; therefore, pending
further ruling by the Bureau the finished product shall not
contain sodium nitrite in excess of 200 parts per million.

d. Thus evolved a major change in curing practices in the US. It is of historical interest that the substance of the original BAI circular is still in effect today.

e. Originally, the primary reason meat was cured was to preserve it and extend its storage life. The secondary reasons were to impart the flavors of the curing agents as well as the flavors that developed through bacterial and enzymatic action during the curing process, and to stabilize the color of the meats. Because pork has a relatively high percentage of well-distributed fat, it is an ideal meat for curing and about 75 percent of all pork cuts are processed for cured products.

f. With the advent of efficient and widespread refrigeration, the need for preserving meat by curing alone has greatly diminished, and factors such as flavor, color, and yield have become of much greater relative importance than the amount of preservation provided. To the technical minded person today, meat curing refers to the production of the characteristic thermally stable meat pigment and the cured meat flavor by the action of sodium nitrite and other curing agents. Less emphasis is given to the preservation qualities of cured meats, even though preservation was the original purpose of meat curing.

6-2. CURRENT PROCEDURES

Modern methods of processing and distributing fresh meat do not require meat to be packed in salt or to be air-dried, but because of the consumer's taste for salted meat and the need for adequate shelf life, salt-cured and smoke-cured meats are still a major part of the meat packing industry. Consequently, the veterinary food inspection specialist must understand the fundamentals of salt-curing and smoking to adequately inspect cured meats for contractual requirements. Salt-cured and smoked meats may be divided into the following categories.

a. **Salt-Cured.** Salt-cured meat is meat cured by soaking in a salt brine or by the application of dry salt, with or without sugar, spices, and nitrates.

b. **Dry-Salt.** Dry-salt meat is cured only by the application of dry salt, with or without sugar, spices, and nitrates.

c. **Pickle-Cured.** Pickle-cured meat is meat cured by soaking it in a salt brine with or without sugar, spices, and nitrates.

d. **Sweet-Pickle-Cured.** Meat that is sweet-pickle-cured is cured by soaking in a salt brine containing a sweetening agent.

e. **Smoked.** Smoked meat is fresh, dried, or cured meat subjected to smoke from hardwood fires.

6-3. CURING AGENTS

The curing agents that may be used are regulated by the USDA. They include the following.

a. **Salt.** Salt is both a curing agent and a condiment. It imparts flavor and accentuates the natural taste of the meat. There are several types of salt available, but dry, common salt produced by refining mined rock salt is the most desirable. Solar salt obtained from seawater is undesirable because it may contain halophilic (salt-loving) bacteria and produce a fishy odor in cured meats. Common iodized salt has an undesirable effect on the action of nitrates and nitrites and may inhibit color fixation.

b. **Nitrate and Nitrite.** Nitrate and nitrite are used primarily to fix the color of cured meat. When salt alone is applied to meat, the natural red color of the flesh is destroyed, leaving it dull and unattractive. The USDA has established definite limits on the amount and types of agents that may be used and on the amount of residue that may be left in cured meats. During recent years, sodium nitrite (prepared either by reduction of sodium nitrate or as a by-product of the synthesis of nitric acid from atmospheric nitrogen) has been used. In the curing process, nitrates are reduced to nitrites by bacterial action. The nitrites furnish nitric oxide, which unites with myoglobin to form nitric oxide myoglobin (the pinkish-red color of cured meat). This nitric oxide myoglobin is unstable until heated in excess of 120° F, where it forms the stable compound, nitric oxide myochromogen.

c. **Sweetening Agents.** Granulated cane or beet sugar, dextrose or glucose (corn sugar), and honey are all used in sugar-cure formulas. Sweetening agents do not contribute any appreciable preservation action to the curing process. They function primarily as a flavoring agent in toning down the brackishness of the salt.

d. **Antioxidants.** When fats are exposed to air, they tend to oxidize and produce a rancid condition. Certain compounds will combat this oxidation and are used in curing formulas. The USDA regulates the use of these compounds.

6-4. SPICES

The use of spices in preserved meats antedates written history. Originally, it was thought that spices possessed preservative powers. Many specifications for cured and smoked meats establish definite requirements for the spices. Quality assurance provisions for these components include physical examination as well as laboratory testing and, in many instances, sensory examination for condition, foreign material, flavor, odor, and color. Identity of spices is determined by examination of labels, invoices, or similar documents.

6-5. METHODS OF CURING

Curing methods vary to some extent in different areas of the country. The interest of the veterinary food inspection specialist is not in specific curing methods and formulas but in how these methods control bacterial activity and spoilage.

6-6. PICKLE CURING

A pickle, as applied to meat curing, is a liquid solution of curing agents, such as salt, sugar, and nitrates. Plain pickle is simply a solution of salt and water. Compound pickle contains salt, plus any other ingredients desired, such as sugar and nitrate. Pickle that contains sugar is commonly known as sweet pickle.

a. **Strength of Salt Solution.** Saturation of water with salt does not interfere with the dissolution of the other curing agents.

(1) Measurement. The strength of salt solution is measured by a salimeter that is calibrated from 0° (the point at which it sinks in water) to 100° (the point at which it floats in a saturated salt solution). The intervening space is graduated in degrees. A 100° plain pickle solution will dissolve sugar and sodium nitrate almost as readily as pure water. The amount of sugar and sodium nitrate used in the average compound pickle gives an additional buoyancy of about 3° to the salimeter; therefore, a compound pickle with a salimeter reading of 78° may be considered to be a 75° salt pickle. The salimeter reading may be taken in any receptacle that has sufficient depth of pickle solution to allow free setting of the instrument.

(2) Types of pickle. The strength of pickle varies depending on its use. For curing purposes, pickle is designated as curing, cover, and pumping pickle.

(a) Pumping pickle is invariably stronger than cover pickle since pumping is used to introduce the curing agents into the meat rapidly without excessive amount of water.

(b) Cover pickle strength varies with the establishment and with the kinds and grades of meat cured. In general, the milder the pickle, the milder will be the cure.

b. **Application of Pickle by Pumping.** Salt penetrates meat slowly; therefore, considerable time must elapse before large pieces of meat are cured. Largely tendinous or fibrous cuts of meat, such as the shank of a ham, and cuts surrounded by skin also cure very slowly. Therefore, to facilitate curing, such cuts are pumped. This is simply the introduction of pickle into the meat by injection. The three common methods of pumping are injection, stitch, and artery pumping.

(1) Injection pumping is performed mechanically. The machine consists of a tabletop conveyor and a bank of attached needles that automatically penetrate the meat and inject a predetermined amount of pickle as the product passes.

(2) Stitch pumping is the introduction of pickle into the various parts of the tissue by hand-operated needle injection equipment.

(3) Artery pumping is the distribution of pickle through the arterial system of the meat. This method is confined to hams and uses the same equipment as stitch pumping.

c. **Pickle Curing Equipment.** Meat is pickle cured in open vats, boxes, or tierces. Vats are constructed in place and made of concrete or other durable material. Other curing equipment is constructed of wood, stainless steel, or galvanized metal. Stainless steel curing equipment is the most easily cleaned and maintained in a sanitary condition. Wooden equipment can be maintained in a clean condition only so long as it is in good repair. Galvanized metal tends to corrode; therefore, thorough cleaning is required very often to maintain these boxes in a sanitary condition. Curing equipment should never be connected directly to a sewer. Tierces are casks or barrels made from wood, usually of 42-gallon capacities.

6-7. DRY-SALT CURING

Dry-salt curing of meat is less complicated than pickle curing. The curing agents are applied directly to the cut surface of the meat either by rubbing or by sprinkling over the surface. To facilitate the adherence of maximum quantities of the curing agents to the surface of the meat and to hasten solution absorption, the meat is sometimes dipped into a vat of brine before applying the dry curing agents. After the pieces are covered with the proper amount of cure, they are piled on top of each other (skin side down) in symmetrical piles. The pieces contact each other as closely as possible to exclude air and reduce the escape of moisture. Racks are used to raise the bottom layers 3 or 4 inches above the floor. The floors of dry salt cellars are usually wet; therefore, splash boards are placed around the piles to avoid soiling the bottom layers of the meat. Clean salt may be heaped around the edges to protect the meat. Dry salt meat is piled in varying heights according to the class of meat.

6-8. DRY-BOX CURING

The use of Dry-box curing is confined largely to pork bellies. The boxes usually have a capacity of 500 to 600 pounds and are made of stainless steel. These boxes are watertight and practically airtight to prevent loss of moisture and discoloration due to oxidation. Before use, the bottoms and sides of the boxes are lined with oiled or wet waxed paper. A specific quantity of bellies and a proportionate quantity of cure are weighed out for each box. The bellies are covered lightly with dry cure and placed in the box, skin down and in close contact with the others.

6-9. CURING AND TEMPERATURE

The temperature of the curing cellars should be between 36° and 38°F. Temperatures lower than 36°F retard the curing process, and temperatures above 38°F are detrimental to the keeping qualities of the meat and pickle. The length of time necessary to cure a piece of meat varies with its size, weight, grade, temperature of the cellar, amount of pumping, and strength of the pickle. Pieces of meat containing bone require more time for curing than boneless cuts. Thick pieces (hams) require longer curing time than thin cuts (bellies and fat backs). Meats cured with nitrite cure more rapidly than those cured with nitrate. Meats frozen, defrosted, and then cured require less time in pickle or cure than meats not previously frozen. Modern curing trends favor the continuous method of curing; that is, processing carcasses into primal cuts, adding pickle, smoking, chilling, and packaging in a minimum number of hours.

6-10. CURING GAINS AND LOSSES

During curing, there is a gain or loss of moisture from the green (uncured) weight of the meat. Change in weight varies with the type of meat, the ratio of fat to lean, the size of the pieces, type of cure, amount of pumping, and the length of time in cure. Lean meat, because of its higher moisture content, shrinks more than fat meat.

a. **Less Nutritive Value.** In addition to losing weight, there is a decrease in the nutritive value of the meat during the curing process. These losses are largely nitrogenous (albuminous) substance, phosphoric acid, potassium salts, and meat bases. They are more pronounced in meat cured exclusively with salt than in meat cured with sugar. Cured meat, as a result, has less nutritive value than the green meat from which it is made.

b. **Weight.** When pickle-cured meats are pumped, the water of the pickle solution adds to the original green weight of the product. Some or all of this added water may be taken out of the product during smoking or drying. Large pieces of meat shrink less than smaller pieces. The salt does not come in actual contact with a proportionately large quantity of the piece, and for this reason, less moisture is extracted from the depths of the piece than from the surface. Box-cured meats shrink less than dry-salt meats cured on racks. None of the extracted moisture is allowed to drain off, and the exclusion of air prevents evaporation. Chopped meat for sausage, largely lean trimmings, is cured in tubs and usually reabsorbs the extracted moisture together with the curing agents. Box-cured pork bellies lose a small amount of moisture, but the curing ingredients absorbed into the meat largely offset this loss of water. The bellies come from cure at slightly less than the green weight.

6-11. BACKPACKING

Meats, especially hams and bacon, cannot be allowed to remain in cure beyond a specified amount of time because they become salty and off-color. From their experience meat packers estimate accurately the quantity of meats that will be

demanded by the trade and place in cure only sufficient cuts to meet the demand. When the market cannot absorb the entire product, it may be backpacked; the meat is removed from the original curing agent 5 to 10 days before the cured age, repacked in tierces of 25° pickle and placed in low temperature cellars at 0°F to 15°F. The cure is not completely arrested, but is retarded by the low temperature and the weak pickle. The low temperature also decreases bacterial activity. Box-cured meats are moved to freezers and frozen without being removed from the boxes.

Section II. SMOKING MEAT

6-12. THE SMOKING PROCESS

In commercial packing house operations, only cured meats are usually smoked. The temperature attained in commercial smoke-houses is favorable to the propagation of spoilage bacteria; therefore, uncured meats may not remain sweet during smoking. Sweet-pickle-cured meats and dry-cured meats are smoked before they are sold. Dry-salt meats are rarely smoked. Meats are smoked to extract moisture from the surface of the meat and/or to reduce the moisture throughout the meat. Smoking reduces the number of surface bacteria 4 to 10 fold. As smoking is continued, heat accompanying the smoke extracts water added during the curing process. This tends to bring the total moisture of the meat back to its original content. Smoking can be continued to further dry the product and in this way extend the shelf life. Smoke deposited on the surface of the meat contains substances which have a retarding effect on the growth of bacteria during storage and produces a resistance to rancidity in the fat caused by oxidation. Many people have developed a taste preference for the flavor of smoked meats. Therefore, some products are smoked for the flavor alone, added stability of the product is not a prime objective.

6-13. SMOKEHOUSES

a. **Stationary or Tower-Type Smokehouse.** The stationary or tower-type smokehouse is probably the oldest type of smokehouse still in use today. It is constructed of brick and usually is the same height as the building or plant. The fire pit is on the first floor and is equipped with gas jets. The flames from the gas jets are smothered with hardwood sawdust to produce smoke. Turning up the gas or using less sawdust controls the heat. To produce more smoke, the gas is turned down and more sawdust is used. The product must be loaded into the smokehouse from each floor level. Each floor of the smokehouse is equipped with an iron grating to allow circulation of heat and smoke from bottom to top. Circulation of the heat and smoke is controlled by a ventilator in the top of the smokehouse that is opened or closed as needed. The outside atmosphere affects the efficiency of the house. During damp, still weather, there is little draft and the product may be smudged rather than smoked. High winds may increase the draft and heat, causing the product to sear or scorch.

b. **Rotary Smokehouse.** The rotary smokehouse is a single compartment, usually the same height as the plant with a continuous link chain on cogwheels, which moves parallel bars from front to rear and top to bottom. The meat may be loaded or unloaded from any floor but must be handled piece by piece. The smoke is generated by burning hardwood sawdust in a stoker-fed firebox located adjacent to the bottom level of the smokehouse. The sawdust is fed to the firebox by a mechanically operated auger. The amount of heat and smoke is controlled by the speed of the auger. The circulation of heat and smoke is controlled by fans, through ducts into the smokehouse.

c. **Pressurized or Air-Conditioned Smokehouse.** This type is made of stainless steel, has automatic smoke generators, and is thermostatically controlled. The air in the smokehouse has a positive pressure and is unaffected by outside temperatures or humidity.

d. **Electrostatic Smokehouse.** This type of house is made in three sections. In the first section, the product is heated to 115° to 125°F, internal temperature. In the second section, the product is subjected to a dense smoke. The smoke is produced outside the smokehouse and is drawn inside through ducts that direct the smoke between two ionizers (one an anode and one a cathode) where it picks up an electrical charge. The smoke is deposited on the product by electrostatic action. In the third section, the product is subjected to heat to stabilize the smoke particles on the surface of the meat. A normal-size bacon belly can be given a smoked appearance and taste in approximately 22 minutes. This method is acceptable for smoking products for military use even though this procedure does not produce the keeping qualities that regular smoking does.

6-14. SMOKEHOUSE OPERATIONS

Meat is hung in the smokehouse so that pieces do not touch. If allowed to touch during smoking, the contact areas will not dry or take on a smoked color. They will remain soft, moist, and pale. These pieces are called touchers.

a. **Hanging Meat.** Hams for smoking are hung by twine strung through the shank, by a stockinet, or by the shank itself. Stockinets protect hams against dripping and give them a smoother smoked appearance. It prevents the carbon and tar-like substances in the smoke from being deposited on the meat and the ham does not take on a dark smoked color. It also helps shape the ham during the smoking process. Stainless steel wire comb hangers equipped with prongs are used to hang light bellies. The prongs are inserted in the flank end of the belly. Briskets and bacon squares are smoked on wire screens placed on the tree arms. All meat drips when first hung in a warm smokehouse, caused by the retained moisture from the soaking vats or the condensation of moisture on the surface of the cold meats. This dripping may stain the meat. The smokehouse doors usually are left open until all dripping has subsided.

b. **The Smoking Process.** Smoke is produced by the combustion of slow burning material, principally hardwood sawdust, which will produce a considerable volume of smoke and combustion products that impart the desirable color and flavor to the meat. Softwood sawdust contains resins and materials that impart undesirable flavors. Sawdust is burned by means of an automatic stoker and the resulting smoke is driven into the smokehouse by means of a fan. The amount of smoke produced can be controlled by the speed of the stoker and the fan.

c. **Heat.** Heat is applied in the smoking process to remove excess moisture, facilitate handling, promote absorption of combustion products, and inhibit bacterial growth on the surface of the meat. Burning sawdust produces very little heat; therefore, heat must be provided by steam coils or hot air ducts. There is no definite standard time or temperature for smoking meat. Commercial smoke means almost anything from 6 to 36 hours of smoking at temperatures from 100° to 160°F. Time and temperature requirements for military procurement are stated in contractual documents.

6-15. SOURING AND IRIDESCENCE

a. **Characteristic Aroma and Souring.** Fresh, cured, and smoked meats, if sound and wholesome, have a distinct and characteristic aroma. Any variation from the characteristic aroma is indicative of deteriorative changes in the physical and chemical makeup of the meat. Such changes are due to enzymatic action and the growth of microorganisms that split protein substances and produce end-products whose odors differ from those of wholesome meat. Souring can occur in all phases and degrees of meat degeneration, particularly that which develops within the meat as distinct from sliminess and other surface deteriorations.

(1) Source of souring. The source of the microorganisms producing meat souring has long been a subject for controversy and debate. For a considerable time, it was thought that they were introduced into the meat through the medium of unsterile equipment, such as thermometers, pumping needles, meat hooks, unclean benches, vats, tierces, workers' hands and clothing, or unsterile pickle and curing agents. It is beyond controversy that surface contamination of meats is productive of surface spoilage.

(2) Temperature requirements. However, it is now the general opinion that some of the microorganisms that produce spoilage are in the meat at the time of slaughter. Souring is in an inverse ratio to the rapidity and completeness with which the microorganisms are brought under control. Rapid chilling of cuts, reduction of temperatures throughout the meat to 35°F within a short period of time, and the maintenance of proper temperature throughout the curing process are the best insurance against souring.

b. **Cause of Iridescence.** Areas of iridescence are frequently found on the cut surface of cured, smoked meats. This color is not due to the curing agents but to the breaking up of white light by the highly fibrous character of the surface and the fat film on these fibers. It does not affect the flavor or quality of the meat and has no sanitary significance. Uncured or improperly cured areas will normally be light in color and have a fresh meat appearance.

Section III. SAUSAGE

6-16. INTRODUCTION

Sausage is a natural product of the meat industry because it makes use of meat trimmings in combination with cuts of meat to produce a marketable product. In this way, the trimmings are not wasted but used to return a profit. Sausage is meat which has been comminuted and further processed. Further processing includes chopping, flavoring, stuffing, linking, curing, cooking, smoking, drying, or any combination of these processes. For our purposes here, sausage will be classified as domestic and dry.

6-17. DOMESTIC SAUSAGE

Within this classification, there are five categories of sausage. With the exception of fresh pork sausage, most sausage is smoked, cooked, and cured with nitrates and/or nitrites.

a. **Fresh Pork Sausage.** This sausage, as the name implies, is prepared with chopped pork and spices. It is not cured, smoked, or cooked. Only enough water is added to facilitate chopping. The sausage is stuffed into casings, and molded into links or prepared in patty form. It requires refrigeration and must be cooked before serving. The shelf life of this product is very short.

b. **Smoked Pork Sausage.** Smoked pork sausage is an all-pork product with spices and curing agents added to the chopped pork. Unlike fresh pork sausage, the stuffed link is subjected to a hardwood smoke and has the appearance and flavor of a smoked product. Smoked sausage must be kept under adequate refrigeration and cooked before serving. Examples of smoked sausage are smoked sausage links and Polish sausage.

c. **Smoked and Cooked Sausage.** This sausage is composed of beef and pork; the percentages of each are determined by the desired end item. The meat components are ground through a conventional meat grinder, processed in a silent cutter, vacuumized, stuffed into casings, smoked, and cooked. This process increases the shelf life substantially. These are ready-to-serve sausages. Examples of smoked and cooked sausages are frankfurters, bologna, and Vienna sausage.

d. **Cooked Sausage.** The meat components of this sausage are fresh, chilled pork livers; pork or pork trimmings; pork jowls; and bacon ends. Some commercial products contain blood. These raw materials are highly perishable and limit the shelf life of the sausage. Cooked sausage is ready-to-serve sausage. Examples of cooked sausage are liver sausage (Braunschweiger style), tongue, and blood loaf.

e. **Cooked or Baked Specialties.** The meat components for this type of sausage are beef and pork. These components are ground in a conventional grinder, processed in a silent cutter, then stuffed into pans or molds for cooking or baking. The sausages (loaves) are dipped in hot oil to brown and glaze. This is a ready-to-serve sausage. Examples of cooked or baked specialties are luncheon loaf, pickle-and-pimento loaf, and meat loaf.

6-18. DRY SAUSAGE

This class consists of two subgroups, dry (hard dry) and new-conditioned (semidry).

a. **Hard-Dry.** Hard-dry sausage is made from fresh meat to which curing ingredients and spices are added. The mixture is permitted to cure for 2 or 3 days and then processed by controlled air drying. Some dried sausage is given a light preliminary smoke but the principal processing is the long, continuous, air-drying process. The most acceptable drying temperature is 54° to 60°F at a relative humidity of 65 to 80 percent. The drying time may vary from 15 days to 4 or 5 months. Examples of these are Genoa and Goteborg.

b. **Semidry.** New-conditioned (semidry) sausage is made from ground fresh meat to which spices and curing ingredients are added. The meat is then allowed to cure for approximately 24 to 48 hours, using either the shelf-cure method or the green hanging method. The sausages are then smoked and may be air-dried. These semidry products are then subjected to high temperature smoke and a much shorter drying period than dry sausage. Examples of this type are cooked salami, cotto salami, and thuringer.

6-19. SAUSAGE CASINGS

There are two types of sausage casings in use today, artificial and natural. Artificial casings are used extensively in place of natural casings because of their availability and low cost.

a. **Artificial Casings.** Artificial casings are those that originate from other than natural sources. They have the advantage of being in adequate supply at all times of the year, are more economical, can be made stronger, more uniform in size and shape, and are usually more attractive.

(1) Cellulose casings. Cellulose casings are manufactured as a by-product of the cotton industry. When used for sausage produced in a plant under the supervision of the USDA, these casings must have an ingredient statement printed on them. The statement itself should stretch proportionately with the casing and remain legible. Casings have varying degrees of stretch, a high stretch is 40 to 60 percent of the original size, and a standard stretch is 20 to 30 percent of the original size. The casings for small sausages are formed from large sheets of cellulose. They are made into tubes approximately 50 feet or longer and are then compressed into lengths of 10 to 12 inches by shirring. This process facilitates storing and handling.

(2) Fibrous casings. Fibrous casings are the strongest and most uniform of all casings. The casings are made from a paper base and impregnated with cellulose. They are the most suitable if the product is to be sliced. These casings are used for the dry or semidry sausage; fibrous-type casings must be used, since they are the only artificial casings that adhere to the meat as it shrinks during dehydration.

(3) Plastic casings and wrappers. Plastic casings or wrappers are used for products that have been completely processed. Due to the low rate of oxygen and moisture transmission, these casings are not suitable for products that require smoking or cooking after stuffing.

(4) Cloth casings. Occasionally, casings made from cloth are used for luncheon meats.

b. **Natural Casings**. Natural casings are better than artificial casings because they are edible, permit more smoke and moisture transfer than artificial casings. These casings are the intestines of sheep, cattle, or hogs; the urinary bladder from calves and cattle; and the stomach of hogs.

6-20. TRICHINOSIS

Because pork is a constant component of dry sausage and because sausage is eaten without further processing, special consideration must be given to the destruction of the parasite Trichinella spiralis. The reservoir and source of infection for trichinosis is chiefly pork and pork products. There are several methods of destroying the parasite, such as heating to 137°F, drying and curing sausage meat in a relatively high concentration of salt, and by freezing with specific times and temperatures. In the quick-freezing method, all parts of muscle tissue of pork or product containing pork tissue will be subject continuously to a temperature not higher than one of those depicted in Table 6-1. The duration of the freezing period is dependent upon the thickness of the meat or the inside dimensions of the container.

a. **Group 1**. Group 1 consists of product in separate pieces not exceeding 6 inches in thickness, or arranged on separate racks with layers not exceeding 6 inches in depth, or stored in boxes or crates not exceeding 6 inches in depth, or stored as solidly frozen blocks not exceeding 6 inches in thickness.

b. **Group 2.** Group 2 consists of product in pieces, layers, or within containers, the thickness of which exceeds 6 inches but not 27 inches, and product in containers including barrels, kegs, and cartons having a thickness not exceeding 27 inches.

NOTE: The product undergoing such refrigeration (quick-freeze), or the containers thereof, will be so spaced while in the freezer to ensure a free circulation of air between the pieces of meat, layers, blocks, boxes, and barrels so that the temperature of the meat throughout will be promptly reduced to the required temperature.

REQUIRED PERIOD FOR FREEZING		
TEMPERATURE	DAYS	
	Group 1	Group 2
5° F	20	30
-10° F	10	20
-20° F	6	12

Table 6-1. Freezing pork products.

6-21. INGREDIENTS OF SAUSAGE

The principal ingredients of sausage are meat, curing agents, and spices. The boned carcass or primal cuts of beef and pork, and by-products such as livers and hearts, comprise the meat portion of sausage. Various spices, chiefly salt and pepper, form the foundation on which sausage seasonings are built.

a. **Binding Qualities of Meat.** The binding qualities of meat are the factors that enable the chopped or finely cut meat fibers to cling together and retain a certain amount of moisture. These qualities are important in the processing of sausage because they determine, to a large extent, the appearance and consistency of the finished product. In general, meats with the best binding qualities, in order of their preference are: hot bull meat (Armed Forces procurement does not permit the use of hot meat in the manufacture of sausage), chilled bull meat, hot cow meat, chilled cow meat, and fresh, lean pork trimmings. Specialty meats, such as lips, snouts, pork stomachs, tripe, and pork skins have very little binding qualities. In addition to its binding qualities, beef adds color and improves the texture of sausage by stabilizing the fat globules. The principle contribution of pork to sausage is flavor. Pork also provides juiciness and tenderness. The use of pork in excessive quantities produces a light color in the finished product, and results in fat cookout or separation, and shortens the shelf life.

b. **Ice, Water, and Salt.** These ingredients are usually considered in combination, although each has a specific function. They are normally added during the chopping process. Ice aids in controlling temperature during the chopping. Added water and water resulting from the melted ice contribute to proper consistency and desired moisture content. The addition of water is controlled by a USDA regulation, which permits up to ten percent before the sausage must be labeled "water added." The primary function of salt is preservation, since salt inhibits the growth of bacteria. It may also be considered as a condiment since it accentuates the natural flavors of the meat and adds flavor to sausage.

c. **Other Ingredients.** Sugar is primarily a flavoring ingredient. Nitrates and nitrites are responsible for color fixation. Spices contribute flavor, color, and aroma to sausage. Most of the meats used in the production of smoked sausage, dry sausage, and new-conditioned sausage are cured to obtain a desired color and flavor and to preserve the meat. Extenders or filler materials, such as cereal, flour, starch, cracklings, and dried milk powder, are added to sausage to increase its bulk. Extenders are used extensively in commercial sausage production, but they are not permitted in sausage being manufactured for the Armed Forces, with the exception of luncheon meat, such as the pickle-and-pimento loaf.

6-22. ABNORMAL CONDITIONS

The following is a list of general sausage defects with which the veterinary food inspection specialist must be familiar.

a. External Defects.

(1) Dark external color. This may be caused by excessive smoke, poor quality meat ingredients, or temperatures that are too high in the smokehouse.

(2) Light external color. This condition is caused by under curing, low temperature in the cooler, touchers, or improper smoke.

(3) Improper size and shape. This is caused by using the wrong casing, improper filling of the casing, or an improper linking operation.

(4) Split casing. This is caused by overstuffing weak casings, excessive heat in the smokehouse, a heavy draft, or an uneven smoke (only one side of the sausage is heated).

(5) Lack of firmness. All sausages are expected to be firm to the touch. When this is not the case, it may be caused by improper filling of the casing, poor quality ingredients, or improper processing.

(6) Improper degree of shriveling. Some sausages, such as frankfurters, are expected to be plump and their casings well filled. Shriveling in a plump-type sausage is due to the use of a poor grade of meat, improper grinding, improper stuffing operation, excessive smokehouse heat, and delay from the smokehouse to the cooking vats, improper chilling, or age. All sausage, unless frozen, will shrink with age. For this reason, it should be used as quickly as possible.

(7) Slime and mold. Slime results from a bacterial growth caused by contamination of the product after it is cooked. When sausages are packed, they should be dry-packed to prevent the development of this condition. Mold also is caused by contamination of the product after cooking. Cooking temperatures are usually sufficient to kill mold organisms and those bacteria responsible for the slimy condition. External mold in dry-type sausage is to be expected and is not cause for rejection of the product unless the casing is damaged. The mold must be removed by washing or scrubbing.

(8) Dirty casings. These may be found occasionally, and are the result of sausage coming in contact with dirty equipment or being dropped on the floor.

b. Internal Defects.

(1) Dark internal color. This is caused by the use of poor meat ingredients or the presence of blood clots or other darkening materials.

(2) Gray center. This condition is the result of improper tempering prior to smoking, insufficient heat during processing, or improper curing.

(3) Green internal discoloration. This condition is the result of bacterial contamination. Green rings are indicative of contamination after heat treatment, while green cores usually indicate contamination prior to the heat treatment.

(4) Improper consistency. Improper grinding, chopping, or mixing may result in this condition.

(5) Improper moisture content. This condition may be caused by the addition of excessive moisture at time of chopping or improper processing methods.

(6) Foreign materials. No foreign materials shall be present in the sausage.

(7) Poor binding qualities. The casing contents must hold together well.

(8) Poor distribution of the ingredients. Poor mixing or improper stuffing may result in an uneven distribution of the contents of the casing. Air pockets are sometimes found in sausage. The sausage emulsion is relatively viscous and tends to retain any entrapped air unless care is taken to prevent the accumulation of air or to remove it by vacuumizing.

(9) Jelly or water pockets. This condition is caused by excess added moisture, poor refrigeration of the meat ingredients, poor quality meat, or water remaining in the casing at the time of stuffing.

(10) Fat pockets. This may be caused by dull knives on the grinder or silent cutter, poor quality meat, poor refrigeration, high processing temperatures, or overheating the meat during grinding and chopping.

Section VI. INSPECTION OF COOKED, CURED, AND/OR SMOKED PRODUCTS

6-23. GENERAL

This section identifies the criteria used to determine compliance with the identity and condition requirements when inspecting cooked, cured, and/or smoked products. The food inspection specialist will apply all of the steps learned in Section III of Lesson 3 when inspecting any meat item.

- a. Sampling (not 100 percent) inspection is the norm, except in the case of small shipments.
- b. Sampling will be IAW the inspection data packet.
- c. Each line item is to be treated independently, that is, as though each line item constitutes a separate lot.

6-24. IDENTITY/QUALITY INSPECTION

a. **References.** Use the reference that is specifically mentioned in the contractual documents to determine identity. Either the NAMP's, The Meat Buyer's Guide or the USDA's IMPS General Requirements, IMPS Quality Assurance Provisions and either the IMPS for Cured, Cured & Smoked, & Fully Cooked Pork Products-Series 500, IMPS for Cured, Dried, and Smoked Beef Products-Series 600, or the IMPS Sausage Products-Series 800. The reference not specifically identified in the inspection data packet can be used as a guide.

b. **Identity of Product.** The veterinary food inspection specialist using the inspection data packet will inspect for gross identity, quality, and quantity (net weight and count). Identity requirements will vary with the product; use the IMPS item number that is referenced.

c. **Inspection Legend/Approved Source Status.** All meat items procured in CONUS must originate from plants where the product is inspected for wholesomeness by the USDA. This is indicated by the USDA inspection legend. The legend will be placed on the packaging or marked end of the packing. The inspector verifies that the inspection legend is present (Section III of Lesson 1), and determines whether the product is from an approved source or if it is exempt from approved source listing.

6-25. CONDITION INSPECTION

a. **Conveyance Inspection.** Inspect the conveyance to determine temperature, cleanliness of vehicle, and presence of off-odors.

b. **Determine Adequacy of Packaging, Packing and Marking.** The inspector determines if the packaging, packing, and marking comply with the requirements in the inspection data packet. There should be no tears, rips, cuts, damage from crushing, nor damage from moisture or blood.

(1) Primary containers of individually packaged items (e.g., frankfurters, luncheon meat) shall be examined for loss of vacuum. If the package does not cling tightly to the product, this is an indication of loss of vacuum.

(2) Canned items will be examined for can defects (see subcourse MD0708, Food Containers).

c. **Determine Age at Delivery.** The inspector determines the age of the product at delivery and the remaining shelf life and compares it to the requirements listed in the inspection data packet.

d. **Determine Temperature.** The inspector determines the temperature of the product and compares it with the requirements given in the inspection data packet.

Continue with Exercises

EXERCISES, LESSON 6

INSTRUCTIONS. The following exercises are to be answered by marking the lettered response that best answers the question, or by completing the incomplete statement, or by writing the answer in the space provided at the end of the question. After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers.

1. What is the percentage of all pork cuts that are processed for cured products?
 - a. 33 percent.
 - b. 50 percent.
 - c. 75 percent

2. Which of the following curing agents are used primarily to fix the color of cured meat?
 - a. Salt.
 - b. Antioxidants.
 - c. Nitrate and nitrite.
 - d. Spices.

3. A liquid solution of salt and water (as applied to meat curing) is termed:
 - a. Compound pickle.
 - b. Sweet pickle.
 - c. Plain pickle.
 - d. Salt brine.

4. A 75 percent salt pickle is measured by a salimeter which:
 - a. Sinks in the solution.
 - b. Floats in the solution.

5. Which pickle is stronger?
 - a. Pumping pickle.
 - b. Cover pickle.
 - c. Salt pickle.

6. Which of the following methods of pumping is used solely with hams?
 - a. Injection pumping.
 - b. Stitch pumping.
 - c. Artery pumping.

7. Stitch pumping of products is the introduction of pickle into various parts of tissue by:
 - a. Rubbing pickle into major muscles of the cut.
 - b. Pumping pickle into the arterial system of the meat.
 - c. Injection of pickle into major muscles with a bank of needles.
 - d. Injection of pickle into various parts of tissue by hand operated needle.

8. Which curing equipment is the most easily cleaned and maintained in a sanitary condition?
 - a. Stainless steel.
 - b. Galvanized metal.
 - c. Wooden casks or barrels.

9. Tierces are casks or barrels made of wood. The capacity is usually ____ gallons.

10. Dry-salt curing agents are applied directly to the cut surface of meat either by _____ or _____ over the surface.

11. Dry-box curing is confined largely to _____ .
12. The stainless steel boxes are _____ and practically _____.
13. These boxes hold a capacity of ____ to ____ pounds.
14. The temperature of curing cellars should be between ____ and ____ Fahrenheit.
15. Which require less time to pickle or cure?
 - a. Meats not previously frozen.
 - b. Meats frozen, then defrosted.
16. Which meat shrinks more when cured?
 - a. Fat meat.
 - b. Lean meat.
17. Which meat has higher nutritive value?
 - a. Green meat.
 - b. Cured meat.
18. There is less shrinkage in:
 - a. Dry-salt meats.
 - b. Box-cured meats.

19. Backpacking of ham and bacon refers to:
- a. Retarding the curing process.
 - b. Placing the product in freezers.
 - c. Checking for product color and salt content.
20. The principal purpose of smoking meats is to:
- a. Retard the growth of bacteria.
 - b. Extract excessive moisture.
 - c. Extend shelf life.
 - d. Enhance flavor.
21. Which of the following products is usually smoked before being sold?
- a. Dry-salt meats.
 - b. Dry-cured meats.
 - c. Sweet-pickle-cured meats.
 - d. Items "b" and "c" above.
22. When hanging meats for smoking, stockinets give hams a _____ smoked appearance.
23. A stockinet prevents _____ substances from being deposited on the meat.
24. Smoke is produced by burning _____ sawdust.

25. Match the type of smokehouse in Column I to the description in Column II.

COLUMN I

COLUMN II

- | | |
|-----------------------|---|
| (1) ___ Tower-type | a. Consists of 3 sections |
| (2) ___ Rotary | b. Stainless steel with automatic smoke generators |
| (3) ___ Pressurized | c. A single compartment, with a continuous link chain on cog wheels |
| (4) ___ Electrostatic | d. Stationary, constructed of brick, same height as the plant |

26. Iridescence found on the cut surface of cured or smoked meats:

- a. Significantly affects the flavor.
- b. Indicates a souring process.
- c. Has no sanitary significance.
- d. Indicates inferior quality.

27. Which sausage is NOT cooked, cured, or smoked, and requires refrigeration before cooking and serving?

- a. Fresh pork sausage.
- b. Smoked pork sausage.
- c. Smoked or cooked sausage.
- d. Cooked sausage.

28. Polish sausage is an example of:
- a. Fresh pork sausage.
 - b. Smoked pork sausage.
 - c. Smoked or cooked sausage.
 - d. Cooked sausage.
29. Frankfurters are examples of:
- a. Fresh pork sausage.
 - b. Smoked pork sausage.
 - c. Smoked or cooked sausage.
 - d. Cooked sausage.
30. Liver sausage (Braunschweiger style) is an example of:
- a. Smoked or cooked sausage.
 - b. Smoked pork sausage.
 - c. Cooked or baked specialties.
 - d. Cooked sausage.
31. Sausages dipped in hot oil to brown and glaze are examples of:
- a. Smoked or cooked sausage.
 - b. Smoked pork sausage.
 - c. Cooked or baked specialties.
 - d. Cooked sausage.

32. Select the class of sausage for which the drying temperature is 54° to 60° F at a relative humidity of 65 to 80 percent.
- a. Hard-dry sausage.
 - b. Semidry sausage.
 - c. Smoked pork sausage.
33. Cooked salami is an example of:
- a. Hard-dry sausage.
 - b. Semidry sausage.
 - c. Smoked and cooked sausage.
34. Which type of sausage casing is used with cooked salami?
- a. Cloth casings.
 - b. Plastic casings.
 - c. Cellulose casings.
 - d. Fibrous casings.
35. What advantages do natural sausage casings have over the artificial casings?
- a. Stronger and more economical.
 - b. Permit transfer of more smoke to sausage and are edible.
 - c. More uniform in size and shape.
 - d. More attractive.

36. Select the period of time required to destroy the parasite Trichinella spiralis, which is found in pork products. There is a 24-inch layer of product. Quick and continuous freezing is employed at a temperature of -10° F.
- a. 10 days.
 - b. 12 days.
 - c. 20 days.
 - d. 30 days.
 - e. 6 days.
37. The meat with the best binding quality is:
- a. Chilled bull meat.
 - b. Hot cow meat.
 - c. Fresh lean pork trimmings.
 - d. Chilled cow meat.
38. The principal contribution of pork to sausage is:
- a. The binding quality.
 - b. Its flavor and tenderness.
 - c. Extension of shelf life.
 - d. The coloring of the finished product.

39. Which of the following external sausage defects can be caused by excessive smoke, poor quality meat ingredients, or temperatures that are too high in the smokehouse?
- a. Improper size or shape.
 - b. Lack of firmness.
 - c. Dark external color.
 - d. Light External color.
40. Which of the following external sausage defects can be caused by the use of a poor grade of meat, improper stuffing operation, or delay from the smokehouse to the cooking vats?
- a. Improper size or shape.
 - b. Lack of firmness.
 - c. Improper degree of shriveling.
 - d. Split casing.
41. According to USDA regulation, sausage must be labeled "water added" if more than ____ percent is added.
- a. 1.
 - b. 5.
 - c. 10.
 - d. 15.

42. Which of the following external sausage defects can be caused by touchers or low temperature in the cooler?
- a. Lack of firmness.
 - b. Improper degree of shriveling.
 - c. Split casing.
 - d. Light external color.
43. Which of the following internal sausage defects can be caused by improper grinding, chopping, or mixing?
- a. Poor distribution of ingredients.
 - b. Improper consistency.
 - c. Gray center.
 - d. Dark internal color.
44. Jelly pockets may be prevented by excluding water from casings prior to fill.
- a. True.
 - b. False.
45. Which of the following internal sausage defects can be caused by poor quality meat, overheating during grinding and chopping, or poor refrigeration?
- a. Fat pockets.
 - b. Improper consistency.
 - c. Water pockets.
 - d. Poor binding qualities.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 6

1. c (para 6-1e)
2. c (para 6-3b)
3. c (para 6-6)
4. b (para 6-6a(1))
5. a (para 6-6a(2)(a))
6. c (para 6-6b(3))
7. d (para 6-6b(2))
8. a (para 6-6c)
9. 42 (para 6-6c)
10. rubbing
sprinkling (para 6-7)
11. pork bellies (para 6-8)
12. watertight; airtight (para 6-8)
13. 500 to 600 (para 6-8)
14. 36° and 38° (para 6-9)
15. b (para 6-9)
16. b (para 6-10)
17. a (para 6-10a)
18. b (para 6-10b)
19. a (para 6-11)
20. d (para 6-12)
21. d (para 6-12)

22. smoother (para 6-14a)
23. tar-like (para 6-14a)
24. hardwood (para 6-14b)
25. (1) d (para 6-13a)
(2) c (para 6-13b)
(3) b (para 6-13c)
(4) a (para 6-13d)
26. c (para 6-15b)
27. a (para 6-17a)
28. b (para 6-17b)
29. c (para 6-17c)
30. d (para 6-17d)
31. c (para 6-17e)
32. a (para 6-18a)
33. b (para 6-18b)
34. e (para 6-19a(2))
35. b (para 6-19b)
36. c (para 6-20 and Table 6-1)
37. a (para 6-21a)
38. b (para 6-21a)
39. c (para 6-22a(1))
40. c (para 6-22a(6))
41. c (para 6-21b)
42. d (para 6-22a(2))

- 43. b (para 6-22b(4))
- 44. a (para 6-22b(9))
- 45. a (para 6-22b(10))

End of Lesson 6